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DEPARTMENT OF TRANSPORTATION

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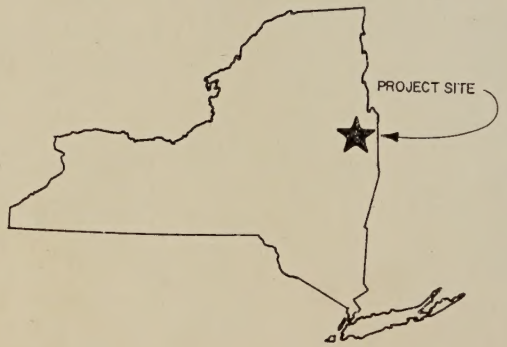

PHYSICAL CONDITION SURVEY
AND
GEOTECHNICAL SUMMARY

GLENS FALLS FEEDER CANAL
GLENS FALLS TO HUDSON FALLS, N.Y.
MARCH 1988

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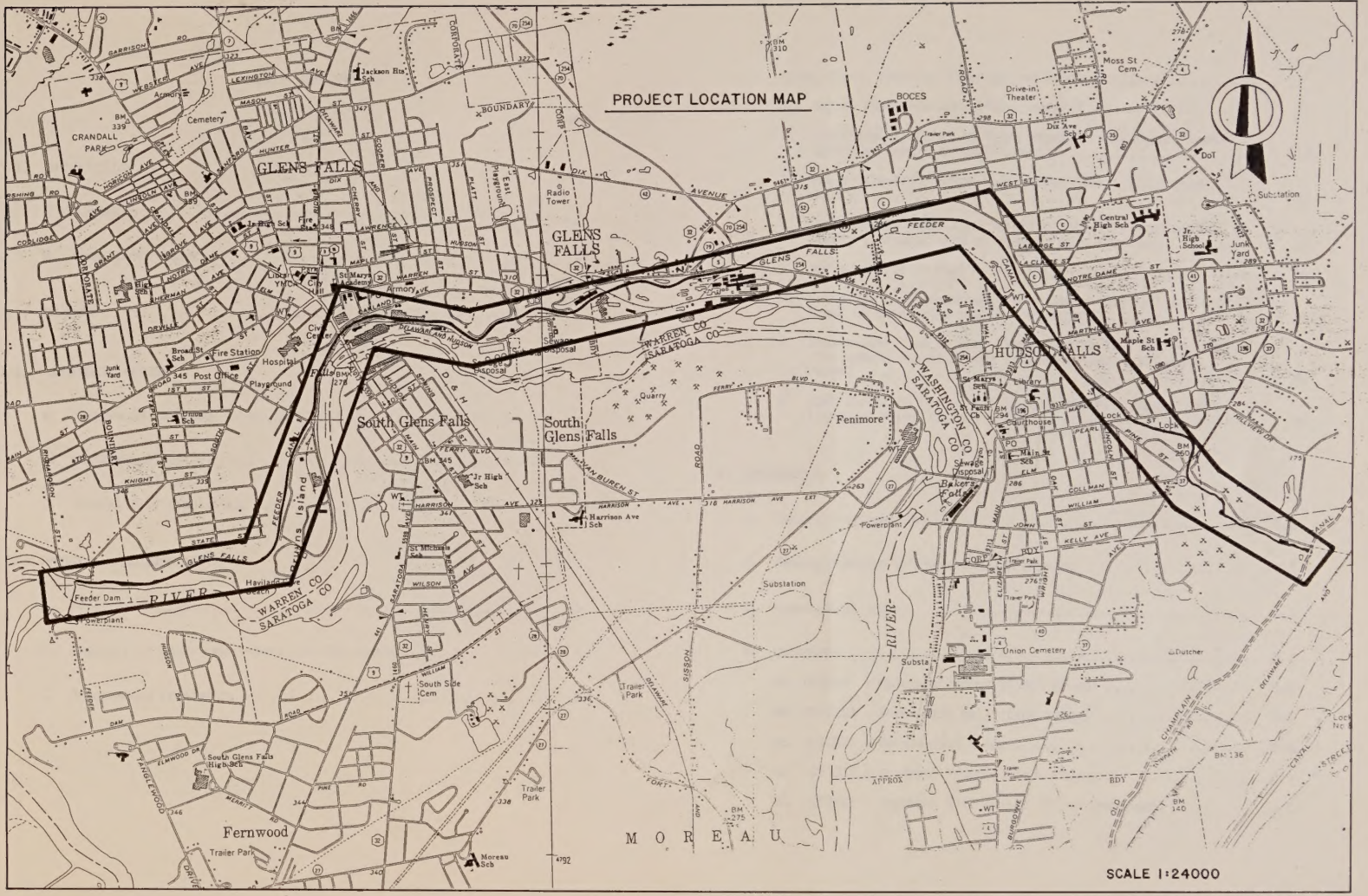
PROJECT LOCATION MAP
GLENS FALLS
SOUTH GLENS FALLS
HUDSON FALLS
FENIMORE
MOREAU
FERNWOOD
WARREN CO
SARATOGA CO
WASHINGTON CO
SCALE 1:24000

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I. INTRODUCTION

A. Purpose

This report is a technical appraisal of the physical condition of the Glens Falls Feeder Canal, as well as a synthesis of information from past construction and subsurface exploration activities. It should serve as an important reference and a basis for present foundation conditions and necessary remedial treatments. The report contains all available information including the following: plans, sections, subsurface data, previous condition reports, terrain reconnaissance and geologic rock outcrop mapping, contract plans, and other pertinent data.

B. Canal Description

The Feeder Canal is located in Warren and Washington Counties, and flows through the cities of Glens Falls and Hudson Falls. The canal obtains water from the Hudson River at the Feeder Dam, runs level for 5.8 miles to Pearl Street, and then begins its decent through a series of abandoned locks to the old Champlain Canal. The canal flows approximately a length of 7.0 miles from the Feeder Dam to the Old Champlain Canal. Once the Feeder empties into the Old Champlain, the Champlain turns north and then easterly before emptying into the New Champlain Canal. A typical prismatic cross-section is 40 feet to 50 feet across the top, 6 to 8 feet deep, and generally carries 2 to 3 feet of water. In many areas the canal section consists of laid up stone walls or concrete walls and floor.

II. SUMMARY

The Feeder Canal has required and will continue to require appropriate maintenance and repair work to ensure its capability to deliver vitally needed water to the Champlain Canal "summit". Since its construction, the Feeder has been plagued with chronic leakage problems. Field inspections, analyses, and subsequent condition classifications have revealed these findings: Only 1/2 percent of the canal alignment requires immediate treatment, but 16.7 percent will require attention some time in the future. It was determined that 71.3 percent will require monitoring or additional maintenance. Additionally, 11.5 percent of the alignment does not require treatment.

III. HISTORICAL REVIEW

A. Purpose of the Canal

The original purpose of the Feeder Canal, completed in 1829, was to reliably supply water to the summit level of the Old Champlain Canal. The Fort Edward Feeder was also used to supply water to the Champlain Canal until about 1843, at which time the R.O.W. was abandoned. Presently this R.O.W. belongs to either the Village of Fort Edward or is privately owned. The Glens Falls Feeder served as a navigational spur line to Glens Falls from the Old Champlain Canal. This canal corridor was used to carry freight, primarily logs and lumber, until about 1932 when the navigational feature of the Feeder Canal was abandoned. However, the Canal still continues to supply vital water to the Champlain Canal Summit level.

B. Maintenance History

Since its completion, there has been continual maintenance of the Feeder Canal. From the mid 1800's to the early 1900's, many repairs and improvements were made on the Feeder Canal to maintain navigation and water supply for the Champlain Canal; there were continual contracts to repair problem leaks, and enlarge the canal to more easily accommodate the barge traffic. Records dating as far back as 1842 described leaks and flow quantity measurements in the canal. However, there are few or no recent records of maintenance activities along the Feeder. Little complete documentation of any maintenance work done by State forces can be found. The only repairs noted are the repairs to the concrete floors and walls in the late 1940's and

1950's. Contract plans have been found for the more recent major repairs made to the floor and walls. These contract plans have been included in the appendix.

In addition, it was learned that periodic dredging was performed to remove items such as natural siltation, grit from storm sewers and other deleterious material. These operations have not been performed for years resulting in the canal being filled by sediment in many locations. This has resulted in a shallow water depth and lower gradient; thus the quantity of flow has been reduced.

C. Historically Problematic Areas

Maintenance of the canal has been an ongoing problem since it was opened in 1829. Excessive leakage led to chronic complaining from property owners adjacent to the canal. In many instances, this leakage caused concern for embankment stability.

Even before completion, there were great problems with excessive leakage. In 1840, it was ascertained that over half the water admitted at the Feeder Dam was lost before it reached the Old Champlain Canal. During the months of August and September, 1840, navigation was wholly suspended on the Feeder Canal because the Fort Edward Dam was so defective all the water for the summit level had to be drawn from the Feeder Canal. The sectional area of the canal was not great enough to allow sufficient water to supply the summit level and still maintain a navigational depth, even without leaks. Therefore, legislation was enacted in 1841 to improve the Glens Falls Feeder Canal. Those requirements consisted of enlarging the prism of the Feeder, widening and deepening the channel of ingress above the lock at the Feeder Dam, and construction of stone sluice bypass structures replacing the old wooden ones. These improvements were completed by June, 1842. In October of 1842, flow measurements were taken yielding the following results:

Quantity admitted, cfm	13,875
Quantity discharged into the Champlain Canal, cfm	6,001
Quantity lost by leakage and evaporation, cfm	7,874

At this time, it was determined that most of the large volume of water being lost was leaking out through the cut section of the canal which extends for approximately 1-1/2 miles through and east of the Village of Glens Falls. Also, west of Glens Falls, the Feeder cut through a fine loose sand; so to prevent erosion of canal banks in these areas, they were lined with a "rubbish stone".

The problem areas may be generally divided into two categories:

1. Bedrock sections

2. Sand/clay sections

Owing to the nature of the design and construction of these sections, much leakage is evident. There are laid up stone walls faced with concrete that has cracked, developed holes, and has fallen off. Through the years, new floors have been constructed and other existing floor areas repaired. It is thought the original concrete floor extends some three miles from Glen Street to midway between Warren Street and the Hudson Falls water tower. In many areas the floor is severely deteriorated, with patches, unevenness, and visible leaks.

The following are historically noted problem leak areas:

1. **Leak Between Feeder Dam and Bush Street** - This area begins approximately 1,500 feet downstream of the Dam where about 200 feet of the stone wall on the tow path (south) side of the canal is either missing or covered with soil. This section was "blown

out" approximately 10 years ago. Presently, there is a 200 foot clay berm on the inboard side and stone filling on the outboard slope adjacent the Hudson River. This section of embankment is still leaking a large quantity of water.

2. **Finch Pruyn - Area East of Route 9 to Shermantown Bridge** - This previously mentioned area consists of alternating layers of thin-bedded and massive limestone with shale partings and dolomite. See geologist report of area Appendix B. Water exits the canal through cracks and holes in the floor and walls, and enters fissures and chasms in the bedrock. Since the rock dips to the south and southwest it causes the seeping water to flow toward the Hudson River. In some instances, this flow path is detrimental, leading to buildings, driveways, and railways. Heavy vehicle loadings, construction of the sewage treatment plant, pile driving operations for the Glens Falls Civic Center, rail traffic at the Finch Pruyn plant, and blasting at the quarry may have had vibration impact on the limestone deposit.

3. **East of Iron Clad Cement Company to Area of Ciba Geigy** - This embankment section has holes in the concrete wall and floor and is leaking at the toe of slope. The area immediately adjacent to the Ciba Geigy Facility has been repaired via a sheet pile and concrete wall. See contract Appendix D. Leaks in the area have been noted on the Contract 56 plans, dated 1912.

4. **West of Warren St. Bridge** - The section is approximately 1,000 feet west of Warren Street where leaks were noted back in 1912. This cut section appears to be in a 30 to 35 foot natural sand ridge with a small berm in the area where the leaks existed. Minor seepage still occurs, with larger streams exiting from the slope further east near the Warren St. Bridge.

5. **Ridge From Warren Street Bridge to Hudson Falls Water Tower** - The canal is cut in the aforementioned natural sand ridge. No leaks were noted on the Contract 56 plans, but the condition survey revealed many streams exiting the slope continually from Warren Street throughout the length of the reservoir to the Hudson Falls water tower. It has not been determined whether these are leaks or natural springs.

IV. PHYSICAL CONDITION SURVEY

A. Field Inspection

During the fall of 1987 and winter of 1988, numerous field inspections were conducted along the length of the canal. These inspections were performed both when the canal was in operation and in the dewatered condition. However, the majority of the inspections were done during the fall when the canal was in operation. One of the first inspections was conducted using a small row boat to traverse the 5.8 mile level section of canal, beginning at the Feeder Dam extending to the first lock (Lock 13) at Pearl Street. This proved to be an excellent means of getting a first overall impression of the condition of the canal and areas needing further attention. The Repair Contract 56, dated 1912, was used as a basis for all of the inspections because it is the most current mapping of the canal alignment. However, it does not include currently realistic mapping, i.e., plans, cross-sections, and contours. Some updated information is available from specific repair contracts, but none of this mapping is tied together since each contract uses new stationing.

The inspections primarily consisted of walking the towpath to assess the condition of the canal proper and associated embankments. Locating areas suspected to have embankment stability problems and evaluating the condition of the canal walls and floors was of utmost importance. Structural observation and interpretations were limited to general items, i.e., cracking, holes, spalling, etc.

Field testing, which consisted of dye tracing and geophysical methods, were utilized in an attempt to further describe problem areas. The geophysical investigation, conducted by the Weston Geophysical

Corporation, included Acoustic Emission Monitoring in conjunction with electrical resistivity testing.

These techniques are described in the summary report prepared by Weston Geophysical Corporation, excerpts of which are included in Appendix C. In brief, this testing was used to determine probable flow paths of canal seepage. The tests consisted of the Acoustic Emission Monitoring (AEM) - measuring sound vibrations (disturbance) through use of a piezoelectric sensor, and Electrical Resistivity testing - tracing the path of an electrolyte created by dumping salt into the canal at the location of suspected leak areas.

B. Analysis of Canal Embankments and Structures

Analysis of the canal alignment was based on embankment stability, earth dike design, seepage considerations, and standard design practices, which were used to determine an estimated condition classification and recommended treatments for each so called homogenous section.

Embankments

Analysis of the canal embankments was made difficult due to no current mapping showing contours or embankment cross-sections. Therefore, much of the analysis consisted of only visual inspections and recommendations based solely on engineering judgement. However, it can readily be stated that a high percentage of the embankment slopes are oversteepened on both the inboard and outboard sides and don't comply with present design standards. Interestingly, much of the canal is constructed in cut along the top of a natural ridge, with the spoil material disposed of along the towpath slopes. These natural slopes are still very steep in many places, i.e., 1 on 1, 1 on 1-1/2.

The assumed canal cross-sections were compared, as best as possible, to the standard sections shown. These sections were obtained from "Guidelines For Design of Small Dams" published by New York State Department of Environmental Conservation. This publication represents current engineering practice and the professional judgement of staff engineers of the State Department of Transportation, State Department of Environmental Conservation Service, and Soil Conservation Service of the United States Department of Agriculture. The above publication is based upon earth dam design criteria established in "Design of Small Earth Dams", 1961, United States Department of the Interior - Bureau of Reclamation.

In general, the canal prism is cut through the native lacustrine shore deposits of sand and silt. These soils are prone to seepage and possibly eventual piping. Piping is defined as the movement of soil particles as the result of unbalanced seepage forces produced by percolating water, leading to the development of boils or erosion channels. Embankments composed of only a high percentage of fine sands and silts will be prone to seepage and eventual piping when the lower portion of the outboard slope becomes saturated. Also, sloughing of oversteepened side slopes may open small leakage channels which cause erosion and lead to eventual failure. There are many oversteepened slopes along the canal alignment; however, only a few of those areas were experiencing sloughing. Therefore, an objective of this study was to locate any seriously oversteepened slopes in substandard areas. The issue of potential piping problems may be further addressed by progressing subsurface drill holes to obtain soil samples for laboratory testing, specifically grain size analysis, and to establish long term groundwater fluctuations. Information concerning piping can be found in Technical Memorandum 645 of the U.S. Department of Interior, Bureau of Reclamation entitled, "Influence of Soil Properties and Construction Methods on the Performance of Homogenous Earth Dams" by J.L. Sherard.

The following is a brief explanation of the geometry of the standard design canal embankment sections developed for previous canal studies which was excerpted and slightly modified for use on this project.

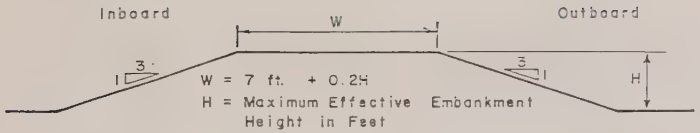
1. Inboard canal embankment slopes steeper than 1 vertical on 2 horizontal can be expected to slough or be susceptible to isolated failures due to sudden drawdown of canal water or excessive saturation due to run-off from storm water. Sloughing is very evident in the area from the Murray Street bridge to the Feeder Dam.

2. The purpose of the top width requirement (W) is to provide sufficient embankment width to prevent the theoretical line of seepage from emerging on the outboard slope. Many areas on this project have an embankment top width (W) far in excess of the recommended. Generally, the top width requirement is met or exceeded throughout the length of the canal. Areas which have side slopes much steeper than that recommended may be quite stable overall, if the top width is great. We do not recommend flattening slopes, except for maintenance cost reduction, of any section that has adequate top width based on application of the standard canal embankment section criteria; that is, any section on which the standard section is completely contained within the existing embankment section.

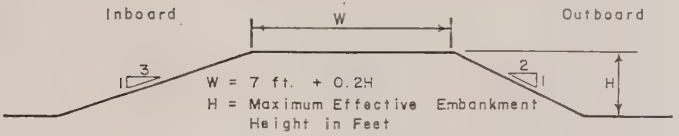
3. The inclination of the outboard slope is specified at 1 vertical on 3 horizontal to provide embankment stability. If seepage control measures are utilized, a steeper allowable slope i.e., 1 vertical on 2 horizontal, is justified because seepage forces are reduced and embankment stability increased.

The estimated existing canal embankment sections were compared with the standard design sections for canal embankments shown below.

The "substandard embankment sections" referred to in the text are existing embankments whose geometry does not conform to the criteria shown:



Standard Design Section for Canal Embankments Without Seepage Control Measures



Standard Design Section for Canal Embankments With Seepage Control Measures

Structures

The deterioration of the concrete wall and floors is a serious problem. In somewhat recent years concrete sills were constructed at the base of the walls and new concrete facings added. However, in many places, the walls are collapsing, missing, cracked or scaled through to the stone masonry.

Structural deficiencies and distresses were recorded, and their severities determined during field inspection. Common distresses which were noted in the concrete walls and floors include cracking, spalling, holes, settlement, and tilting.

Based on the results of our field inspection of the canal embankments and structures, we have classified the condition of each area into

one of four categories. The major concerns when establishing these condition classifications are embankment stability and the potential hazard to lives and property. Due to the fact that the canal prism is formed in bedrock and in fine sands and silts leakage has historically been a problem and can be expected to continue to be a problem. If a major concern is the loss of canal water caused by leakage, then the condition classifications given for each section must be examined. These categories are as follows:

Condition Classification	Description
Class 1	Immediate Positive Treatment Required
Class 2	Future Improvement Required
Class 3	Minimal Maintenance or monitoring required
Class 4	No treatment required

The station by station analyses which are shown in the text outline the section description, general physical condition and foundation problems within each canal area. Recommended treatment to correct the foundation problems noted is included.

The entire canal alignment was classified with the following results:

Condition Classification	Percent of Total Length*
Class 1	0.5
Class 2	16.7
Class 3	71.3
Class 4	11.5

*The 1.1 miles of the Old Champlain Canal was given a condition classification, but is not involved in the percent of total length.

C. Recommended Treatments

Due to the length and varying condition of the Feeder Canal there are a host of recommended treatments. These treatments are described in more detail under the recommendation sections of the Physical Condition Survey Findings and Recommendations text. Recommendations are given for each so called "homogenous" section with its station limits.

The overall impression gained from numerous field inspection is that the canal is in a state of disrepair in many places. The canal prism is filled with deleterious material i.e., fallen trees, plant growth, garbage, sediments, etc. In addition, the embankments are covered with vegetation, which is dense in many areas. Therefore, it is almost a blanket recommendation to clean the canal and remove the vegetation along the embankments and in the canal. In many areas the canal has become shallow and reduced in width due to the accumulation of sediments and sloughing of the inboard slopes. The corresponding treatment recommendation is to deepen and reshape the channel in these areas. It is suggested that a thorough hydraulic analysis be performed on the canal to ascertain the quantity of flow needed to supply the summit, flow rates, etc.

In certain areas, recommendations of slope flattening and stone filling are given to ensure stability of both inboard and outboard slopes.

Other recommendations deal with the sealing of leaks within the canal proper to allow one to choose from the following established methods: geomembrane liner, new concrete trough (walls and floor), sheeting, concrete facing and patches, temporary clay linings. All of these methods to control seepage and leakage from the canal have been tried or are currently under construction and should be monitored for performance feedback.

In summary, the problem of canal leaks can be treated by two

alternatives. Our suggested alternative is to locate the area of leakage within the canal and seal this area with one of the previously mentioned treatments. Another alternative is to accept the continuation of leakage, but perform treatments to ensure embankment stability.

CANAL PLANS, PHOTOS, FINDINGS, and RECOMMENDATIONS

REFERENCE PLANS

Preliminary Structure Plans Used for Analysis were

Prepared By: DEPARTMENT OF STATE ENGINEER AND SURVEYOR

Scale: 1" = 100' Date: 7/1/12

Prepared By: David Ingalls

Drawn By: Michael C. LaBrosse

Dwg. Reviewed By: Timothy J. Bender

Checked By: P. Walton D. Page

GENERAL NOTES

The subsurface explorations shown hereon were made between 5/18/49 and 8/10/87.

1) General soil and rock (where encountered) strata descriptions and indicated boundaries are based on an engineering interpretation of all available subsurface information by the Soil Mechanics Bureau and may not necessarily reflect the actual variation in subsurface conditions between borings and samples. Detailed data and field interpretations of conditions encountered in individual borings are shown on the subsurface exploration logs.
2) The observed water levels and/or conditions indicated on the subsurface profiles are as recorded at the time of exploration. These water levels and/or conditions may vary considerably, with time, according to the prevailing climate, rainfall or other factors and are otherwise dependent on the duration of and methods used in the explorations program.
3) Sound engineering judgment was exercised in preparing the subsurface information presented hereon. This information was prepared and is intended for State design and estimate purposes only. Its presentation on the plans or elsewhere is for the purpose of providing intended users with access to the same information available to the State. This subsurface information interpretation is presented in good faith and is not intended as a substitute for personal investigation, independent interpretations or judgment of the Contractor.
4) All structure details shown hereon are for illustrative purposes only and may not be indicative of the final design conditions shown in the contract plans.

LEGEND

The following tables summarize the descriptive information used on this profile

Density (Non Plastic Soils)	No of blows per foot of penetration of 2 inch O D (1-1/2 inch I.D) sampler using a 300 lb drop hammer, 18 inch fall
Very Loose	0-3
Loose	4-8
Medium Compact	9-20
Compact	21-35
Very Compact	over 35
Consistency (Plastic Soils)	
Very Soft	0-2
Soft	3-6
Firm	7-12
Stiff	13-20
Hard	over 20

The system for describing soil materials shown on this drawing is detailed in "Soil Description Procedure" Official Issuance No. 7.41-5 STP 2/75 prepared by the New York State Department of Transportation Soil Mechanics Bureau.

SINCE THE GLENS FALLS FEEDER CANAL HAS ITSELF CHANGED WITH TIME, AND DUE TO THE VARIABILITY OF COPY REPRODUCTION, THE FOLLOWING DRAWINGS SHOULD NOT BE REFERENCED FOR EXACT LOCATIONS. THE BASELINE USED IN THIS REPORT IS FROM CONTRACT 56 PLANS OF 1912. FEW CHANGES TO THE TRACINGS HAVE BEEN MADE TO REFLECT CURRENT FEATURES.

SYMBOLS

DRILL HOLE AH, DA, DN, PH

OBSERVED WATER LEVEL

Concrete and Blacktop

Very Loose to Medium Compact Gray-Brown Silty Sand, Gravelly

Very Soft to Firm Gray-Brown Clayey Silt, Gravelly

Very Soft to Firm Gray-Brown Silty Clay, Gravelly

Stiff to Hard Gray-Brown Gravelly Silt, Clayey

Limestone Bedrock

Refusal

APPROVED March 15, 1988

Wesley P. Moody
DIRECTOR
SOIL MECHANICS BUREAU

REGION NO. 1
COUNTY WARREN & WASHINGTON

DWG. NO. 1 SM 2291

STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION
TECHNICAL SERVICES DIVISION

GLENS FALLS FEEDER CANAL
PHYSICAL CONDITION 1988
P.I.N. 1940.77.

BASELINE SCALE: 1"=100'

III. PHYSICAL CONDITION SURVEY FINDINGS AND RECOMMENDATIONS

Station	Section Length	Condition Classification
None	1.1 miles	3

Section Description

Old Champlain Canal

Condition

The Old Cnamplain Canal is heavily overgrown with trees and brush, but still continues to satisfactorily supply water to the Champlain Canal "summit". There is deleterious material in the old canal, i.e., fallen trees, brush, grass, sediments, etc., which will tend to impede the flow of water.

Recommendation

Clean cnannel, removing all plant growth and debris. Also, cut vegetation along banks and towpath. Dredge channel to remove sediments.

Station	Section Length	Condition Classification
32+00 - 64+00	3,200 feet	3

Section Description

Begins at Bridge No. 100 and extends northwesterly, encompassing locks one through five, to the area of the five combined flight of locks (locks six through ten).

Condition

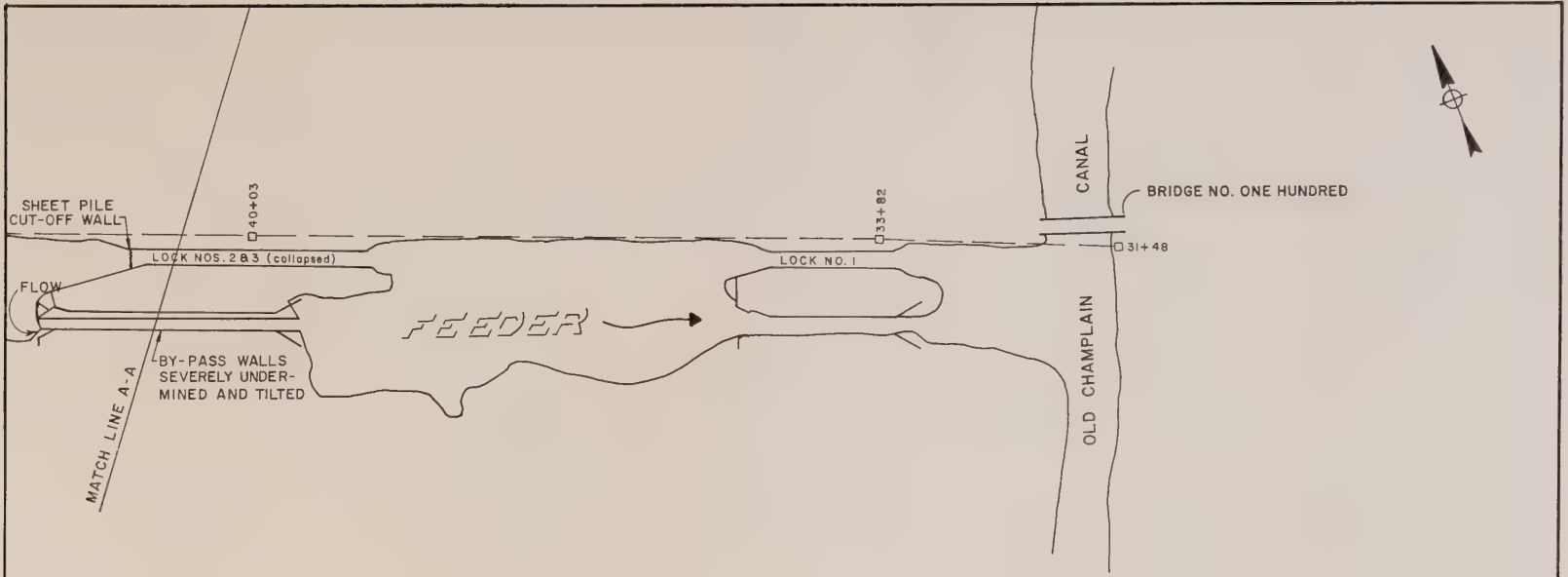
Generally, these structures throughout the section are in disrepair. Station 39+00 - 41+00 - Combined Lock 2 & 3 are sheeted closed on the upstream end routing water through the By-Pass structure. Lock No. 2 walls have collapsed on the upstream end. The By-Pass walls have been severely undermined by the constant flow of canal water and are tilting into the channel. It can be expected they will eventually be undermined to a point where they will fall into the channel. Station 52+50 - Lock No. 5 could not be found. Therefore, all the water is flowing through the By-Pass, which has begun to be undermined by the scouring action of the canal water when it turns 90 degrees as it flows into the structure. Station 57+80 - 63+87 - The Five Combined Locks (Locks 6 - 10) are still standing in good condition and presently contain the canal flow within the flight. However, the By-Pass structure has collapsed and the adjacent aqueduct has been abandoned. Currently, there is a project let to repair the approach wall which leads into Lock 10. This Contract D252317 (1988) consists of backfilling and undersealing of the undermined wall with grout to provide a stable foundation. See Appendix D.

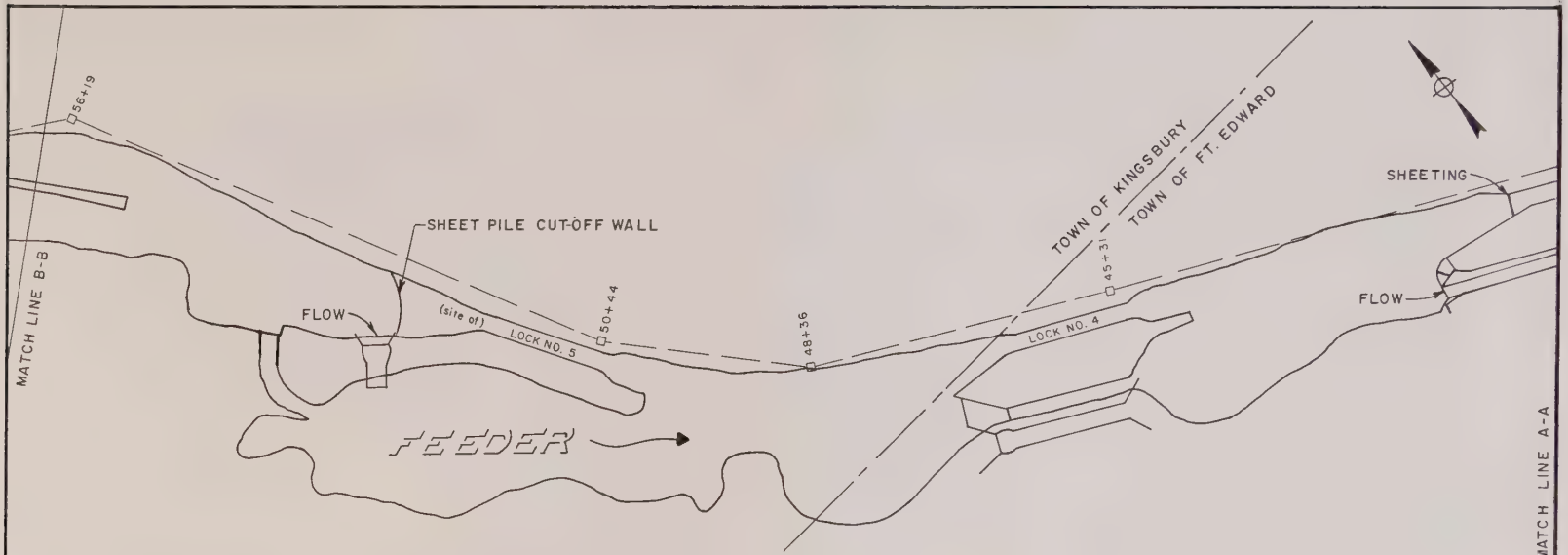
The canal is filled with debris and natural sediment. Sloughing and erosion of the slopes has occurred. Basically, the canal has transformed to the state of appearing to be a natural stream flow.

Recommendations

Clean and dredge canal proper, cut vegetation along embankments, and control plant growth in canal. Slope protection consisting of stone filling and geotextile could be used in areas where erosion is a problem. Monitor structures and flow path characteristics of canal.

COLLAPSED WALL AT LOCK 2; sta. 40


SHEET PILE
CUT-OFF WALL
40+03
33+82
CANAL
BRIDGE NO. ONE HUNDRED
31+48
LOCK NOS. 2 & 3 (collapsed)
LOCK NO. 1
FLOW
FEEDER
BY-PASS WALLS
SEVERELY UNDER-
MINED AND TILTED
MATCH LINE A-A
OLD CHAMPLAIN


MATCH LINE B-B
56+19
SHEET PILE CUT-OFF WALL
FLOW
(site of) LOCK NO. 5
50+44
48+36
FEEDER
TOWN OF KINGSBURY
TOWN OF FT. EDWARD
45+31
LOCK NO. 4
SHEETING
FLOW
MATCH LINE A-A

Station	Section Length	Condition Classification
64+00 - 89+00	2,500 feet	3

Section Description

Begins at area of "five comoined" (Burgoyne Ave.) and extends to lock 13 at the Pearl Street bridge. This section includes lock 11 through lock 13 as it passes along a residential area to the north.

Condition

Lock 11 is missing and the By-Pass no longer functional. Instead, there is a newer structure consisting of four wheel operated sluice gates opening into two 42 inch corrugated metal pipes beneath the New Burgoyne Ave. Lock 12 is in fairly good condition and has water flowing through it. Lock 13, which controls the level of the upper canal, is in good condition except for slight bulging of the south lock wall on the upstream end. The By-Pass built for mill purposes is no longer functional. The water from the lock flows under Pearl Street via two corrugated metal pipes, one being a 9 foot high arch and the other a 3 foot diameter pipe.

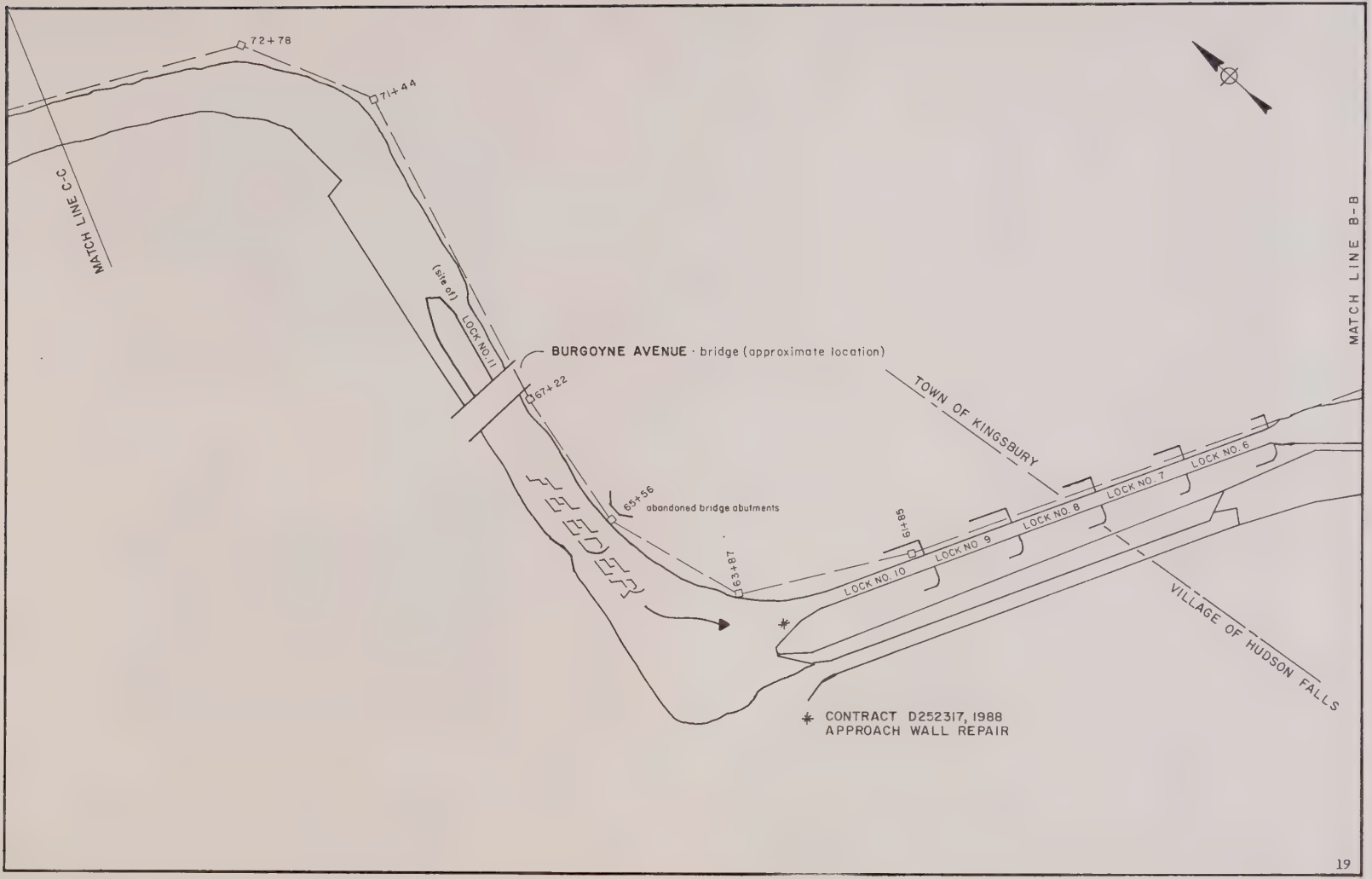
Generally, the canal is overgrown with trees and brush. Also, there is debris in the channel, including natural sediments.

Recommendations

Clean and dredge canal proper. Attention should be given to the sill height of lock 13. The level of this sill governs the level of the entire upstream canal section.

SLUICE GATES AT BURGOYNE AVENUE; sta. 68

LOCK 12; sta. 80


72+78
71+44
MATCH LINE C-C
(site of)
LOCK NO. 11
BURGOYNE AVENUE · bridge (approximate location)
67+22
TOWN OF KINGSBURY
65+56
abandoned bridge abutments
63+87
58+95
LOCK NO. 10
LOCK NO. 9
LOCK NO. 8
LOCK NO. 7
LOCK NO. 6
VILLAGE OF HUDSON FALLS
MATCH LINE B-B
* CONTRACT D252317, 1988
APPROACH WALL REPAIR

Station	Section Length	Condition Classification
89+00 - 112+00	2,300 feet	3

Section Description

Begins at the northwest end of lock 13 (Pearl Street) and extends to Martindale Street. This is entirely a cut canal section. Station 102 ± and Station 107 ± have bedrock outcropping.

Condition

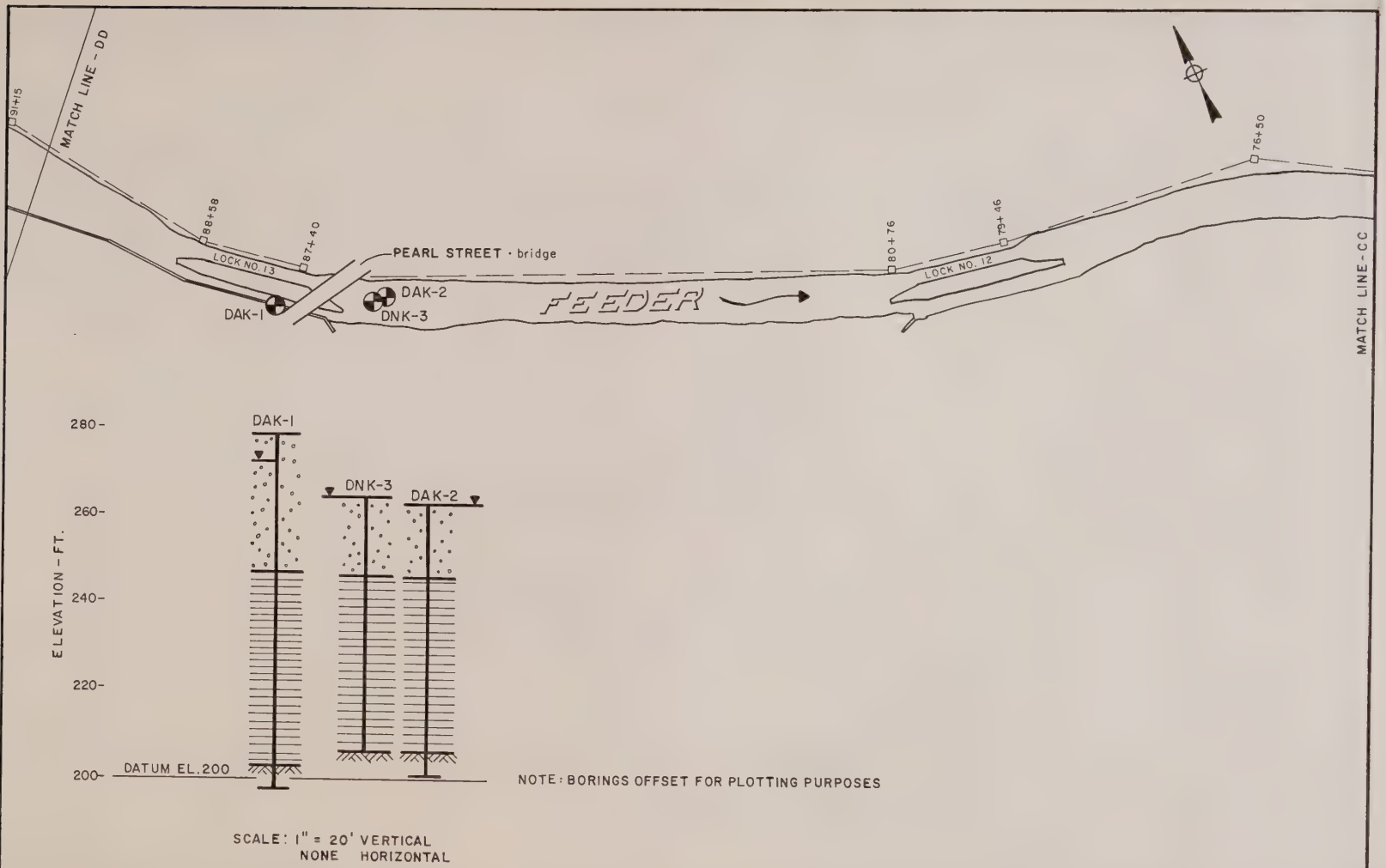
Because this is a cut section, the canal flows similar to a natural river. However, some remnants of the old laid up stone wall are intermittently visible. The top of the canal banks are heavily overgrown with trees and brush. In places, the canal is cluttered with debris, i.e., fallen trees, brush, grass, sediments, etc.

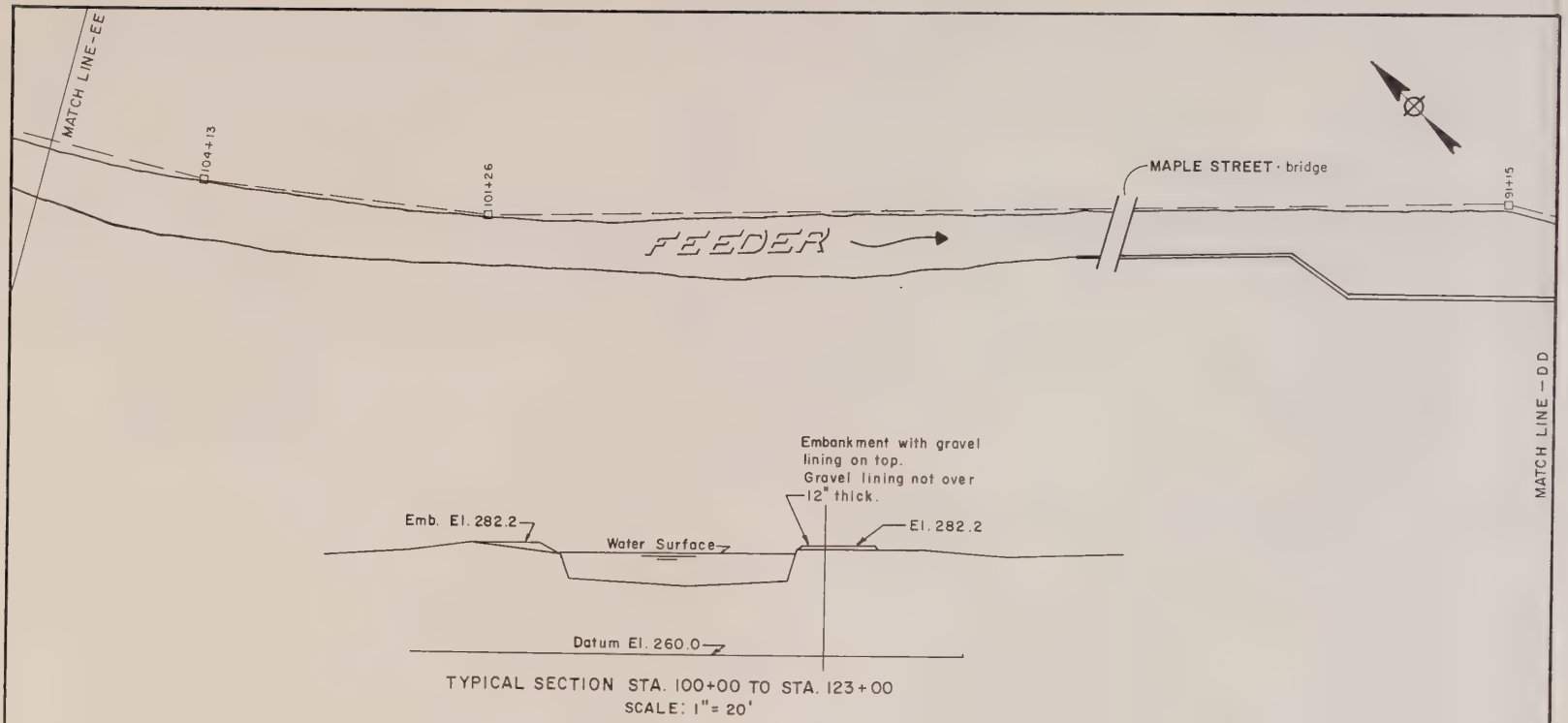
Recommendations

Clean debris from canal, and deepen channel. When shaping the channel, it may be necessary to flatten eroded slopes and line with stone fill slope protection. Cut slope vegetation.

ENTRANCE OF LOCK 13; sta. 87

VIEW FROM LOCK 13 TO MAPLE STREET; sta. 89


MATCH LINE - DD
91+15
88+58
87+40
LOCK NO. 13
PEARL STREET · bridge
DAK-1
DAK-2
DNK-3
FEEDER
80+76
79+46
LOCK NO. 12
76+50
MATCH LINE - CC
ELEVATION - FT.
280
260
240
220
200
DATUM EL. 200
DAK-1
DNK-3
DAK-2
NOTE: BORINGS OFFSET FOR PLOTTING PURPOSES
SCALE: 1" = 20' VERTICAL
NONE HORIZONTAL



TYPICAL SECTION STA. 100+00 TO STA. 123+00
SCALE: 1" = 20'

Station	Section Length	Condition Classification
112+00 - 125+00	1,300 feet	3

Section Description

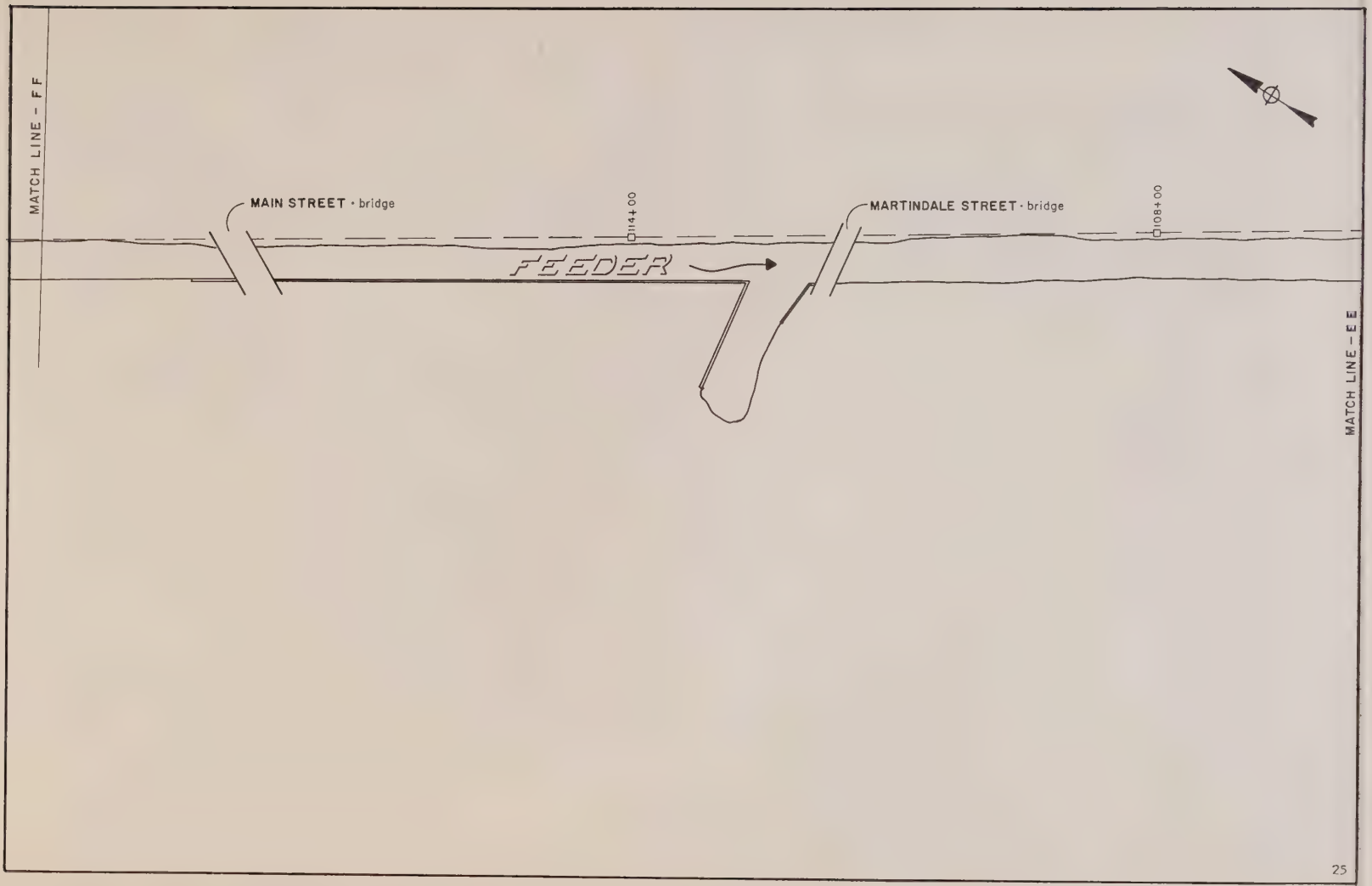
Begins at Martindale Street and ends at the Hudson Falls water tank. The north wall consists of concrete, while the south is laid up stone. The section is constructed in cut.

Condition

The concrete walls are in good shape, while the stone walls have fallen in places throughout the section. Again, debris are intermittently scattered throughout the section.

Recommendation

Deepen and shape channel, flatten and stone line inboard slopes as necessary for stability. Clean debris from canal. Cut trees and brush along embankments.


MATCH LINE - F F
MAIN STREET · bridge
114+00
MARTINDALE STREET · bridge
108+00
FEEDER
MATCH LINE - E E

Station	Section Length	Condition Classification
125+00 - 127+00	200 feet	1

Section Description

Leak Area - Hudson Falls Reservoir near water tower. The south embankment has water exiting the slope approximately at its midpoint. The outboard slope has eroded back towards the canal, and is only 15-20 feet from the southern canal wall.

Condition

This area has formed a deep gully in the outboard slope of the canal embankment, which rests on top of a natural sand ridge. The slope has become oversteepened due to the continued erosion and sloughing caused by the water flow. It is difficult to ascertain the quantity of flow exiting, but it is substantial, and occurs in more than one place along the slope.

This area of the canal was dye tested with inconclusive results. Unsuccessful attempts were made in getting the dye to exit from the large leak. Both fluorescent dye tablets and green food color were tried. It is questionable if this water and other streams originate from the canal, or if they are natural springs. Water works personnel stated that 99.9 percent of this water is originating from naturally occurring springs.

Quantab soluble salt indicators were used to compare the salinity of the water in the canal versus the water coming through the slope. The results showed a higher salt content in the canal versus the water exiting the slope, indicating that the stream may be natural, rather than a leak from the canal.

Recommendations

To ensure stability, the embankment should be rebuilt using a stone filling item. The use of a geotextile bedding may be used to retain the fine sand material before placing fill. The new slope should be flattened to possibly a 1 on 3 slope if R.O.W. permits.

If a concern is the loss of water, further investigate the area to ascertain if water is leaking from canal, or if there are natural springs. If it can be determined that the canal is leaking, treatment of the canal wall and/or floor is necessary. The canal could be treated by means such as: geomembrane liner, sheeting, concrete facing, clay lining, etc.

If nothing else, this section should be monitored.

Station	Section Length	Condition Classification
127+00 - 148+00	2,100 feet	2

Section Description

Begins with a 1,000 foot sheet pile section which extends up to station 136+00. The sheets are 1/2 inch x 15 inch and estimated to be 30 feet long. Throughout most of the section the old laid up stone walls are visible. The floor consists only of a sandy material. At approximate station 131+00, there is a 5 ± foot deep hole in this sand floor. The canal prism is constructed in cut along the top of the natural sand ridge adjacent to, and west of the reservoir.

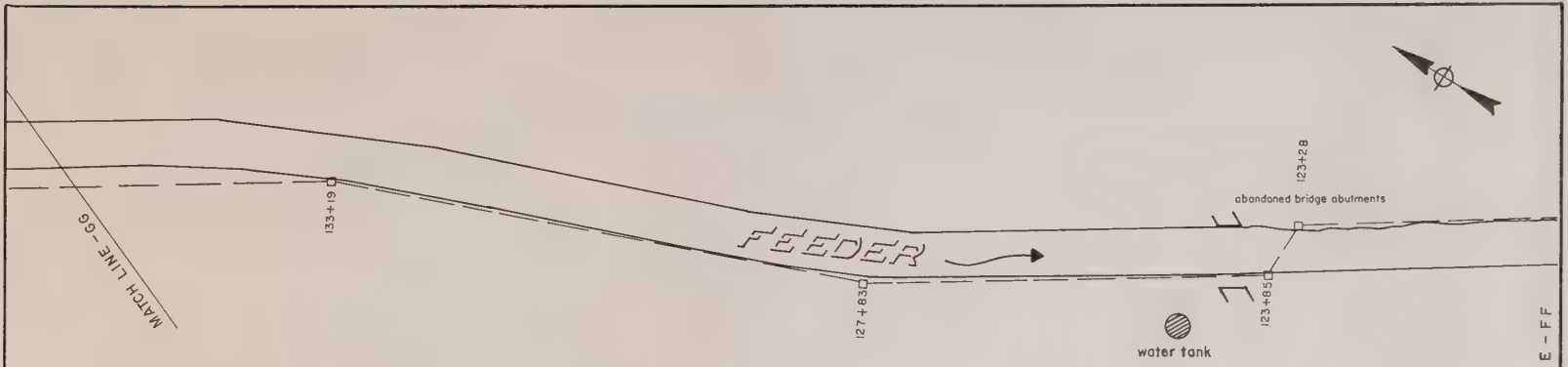
Condition

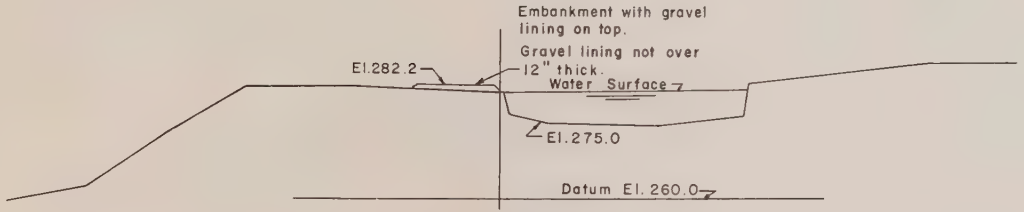
The stone walls have collapsed in many areas, which has allowed sloughing of the embankment on the inboard side. The canal is cluttered with debris, i.e., fallen trees, brush, grass, garbage, etc. Areas have been filled by the accumulation of sediments where the stream velocity is reduced. The outboard slope is continually dissected by small streams normally exiting near the toe of slope. It has not been determined whether these are natural springs or leaks. A seepage analysis determined that if the water was leaking from the canal it should exit at approximately 1/3 the embankment height, however, this is not the case.

Recommendations

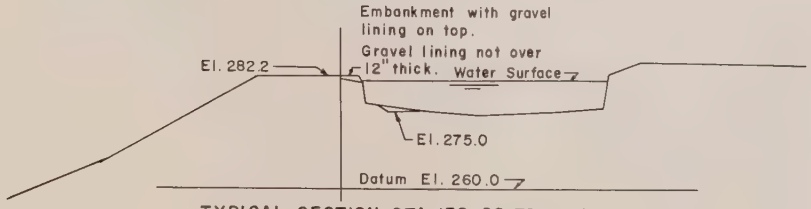
Clean and shape channel. The debris should be removed and the inboard slope graded and dressed to ensure stability and prevent erosion. The critical area is the south wall which is within 15 to 20 feet from the top of the steep outboard slope in many places. The steep southern outboard slope which is dissected by the streams may be flattened and stone fill placed in areas where extreme erosion has progressed to the top of the slope. The hole in the floor at station 131+00 ± should be filled with nearly impervious clay material. The trees and brush on the embankment should be cleared.

STREAMS DISECTING THE OUTBOARD SLOPE
IN THE RESERVOIR AREA; sta. 135-136

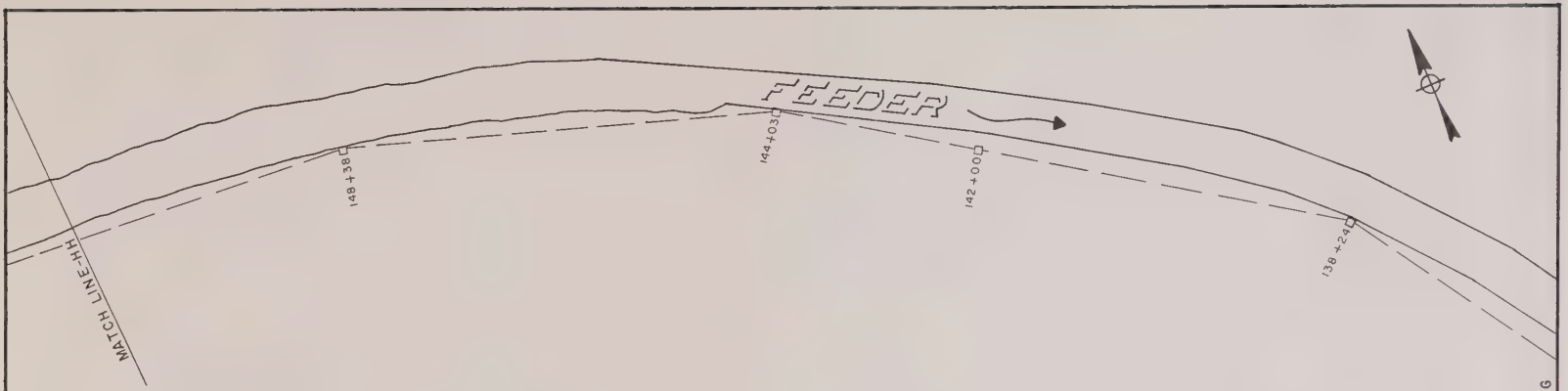


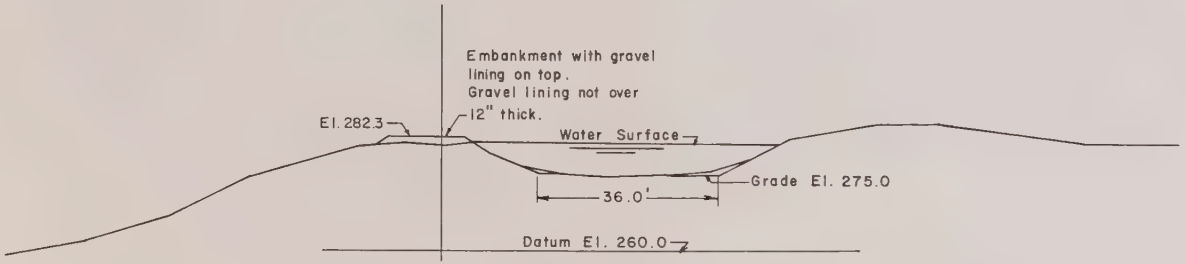


TYPICAL SECTION STA. 123+00 TO STA. 130+00
SCALE : 1" = 20'



TYPICAL SECTION STA. 130+00 TO STA. 140+00
SCALE : 1" = 20'





TYPICAL SECTION STA. 140+00 TO STA. 160+00
SCALE: 1" = 20'

Station	Section Length	Condition Classification
148+00 - 168+00	2,000 feet	2

Section Description

Starts at the beginning of concrete walls and floor and ends at the Warren Street bridge. It is a cut section along the top of the natural sand ridge. A stone culvert under the canal (Station 166+00 ±) supplies water to the Hudson Falls water company.

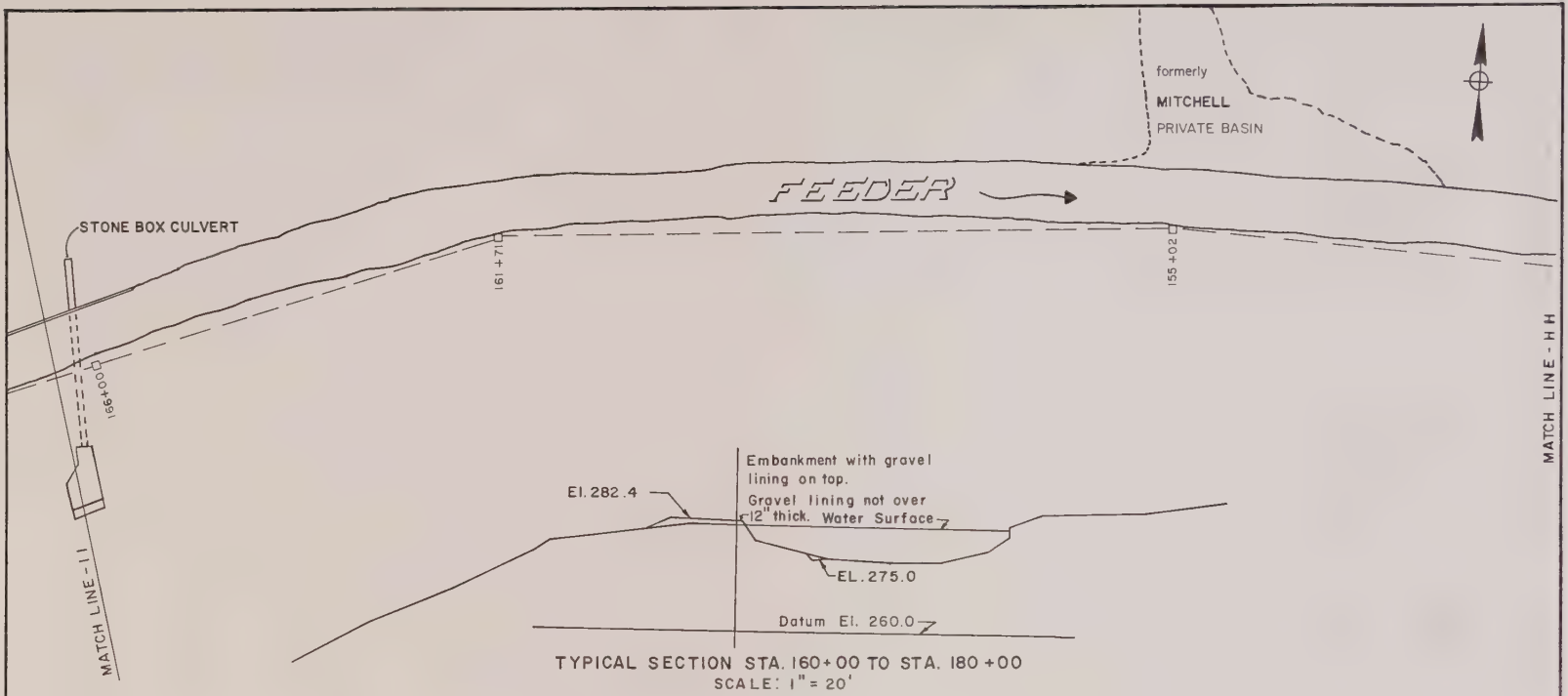
Condition

There are visible holes and facing falling from the walls (approximately Station (160+00 - 165+00). The remainder of the section appears to be in generally good condition. There is a series of streams exiting from the southern outboard slopes. The former Mitchell Basin on the north side has been blocked off by a concrete wall, which is also in good condition. A few areas have been filled with debris, i.e. fallen trees, brush, sediments, garbage, etc.

Recommendations

Clean debris from canal. Repair holes in walls and clean sediment from floor and inspect for holes and cracks. Clear brush and trees on the embankment.

NORTH WALL IN DISREPAIR. NOTE WALL IN BACKGROUND IS IN GOOD CONDITION; sta. 167



TYPICAL SECTION STA. 160+00 TO STA. 180+00
SCALE: 1" = 20'

Station	Section Length	Condition Classification
168+00 - 172+00	400 feet	2

Section Description

Begins at Warren Street bridge and extends west for 400 feet. The section is comprised of concrete walls and floors and is cut on top of a natural sand ridge.

Condition

The north wall is severely cracked, and the facing has fallen off exposing the wire mesh reinforcing and laid up stone wall. There are small streams flowing from the toe of the south slope. It is questionable whether the water is leaking from the canal or natural water exiting the slope.

Recommendations

Repair holes in wall and further investigate the source of the water exiting the south slope. If it is determined the canal is leaking, repairs would be needed to seal the leaks. Also, the oversteepened slope should be flattened to prevent the phreatic water line from reaching the slope surface. Clean canal and cut trees and brush.

Station	Section Length	Condition Classification
172+00 - 184+00	1,200 feet	3

Section Description

This is a concrete wall and floor section cut on top of a natural sand ridge. Some bedrock is exposed at station 181+00 to 182+00. There is a gully and ridge adjacent to the canal from Station 182+00 to 185+00; this is probably the skewed approach embankment for an old railroad.

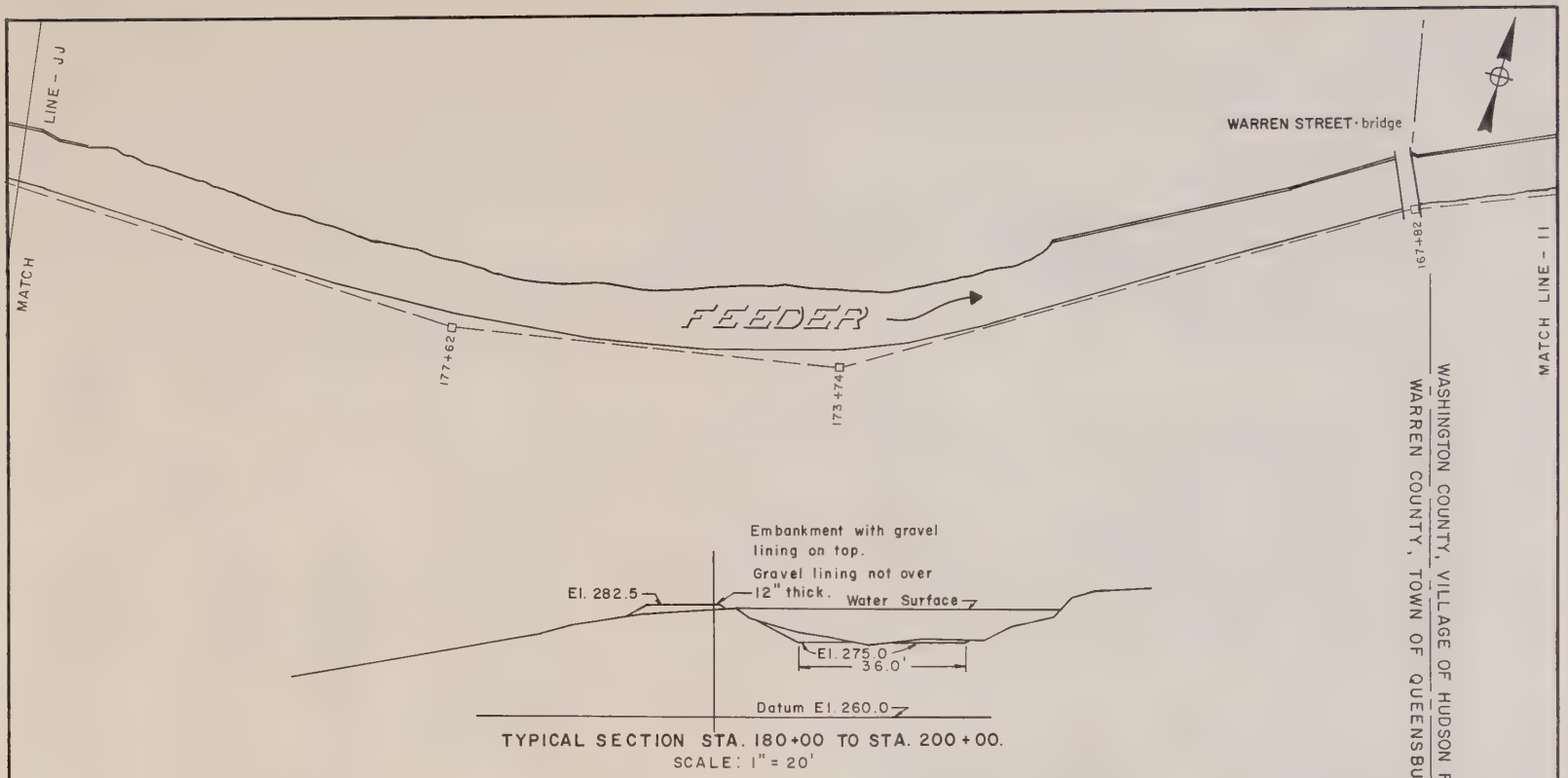
Condition

The concrete walls are in fairly good shape. There is seepage of varying degrees occurring frequently at the south embankment toe of slope. There is some debris in the canal. Trees and brush are encroaching on the canal embankment and walls, primarily on the north side.

Recommendations

Monitor leakage through the embankment slopes. Clean debris from canal. Cut trees and brush encroaching on canal.

NORTH WALL; sta. 170



TYPICAL SECTION STA. 180+00 TO STA. 200+00.
SCALE: 1" = 20'

Station	Section Length	Condition Classification
184+00 - 199+00	1,500 feet	3

Section Description

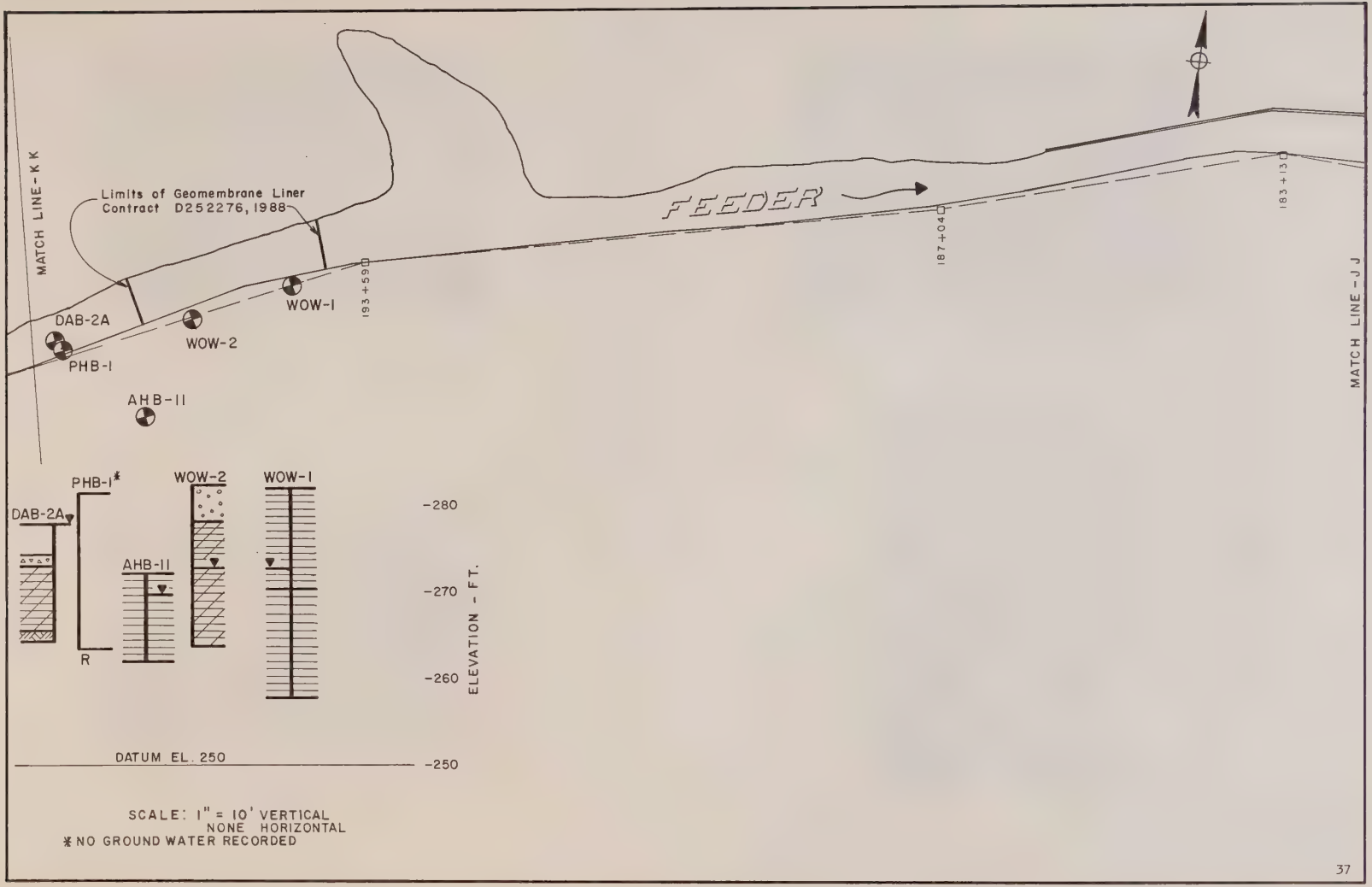
Begins near the Yellow Truck garage (station 184+00) and continues to the Rte. 254 bridge. At station 193+00, an old wide waters basin is adjacent to the Ciba Geigy plant. Concrete walls turn into and terminate at the basin. There is evidence of a concrete floor, but some areas are sandy thereby masking any concrete present.

Condition

This section is characterized by much seepage exiting the outboard slope of the south embankment. The areas of greatest seepage are at the following stations: 185+00 - 187+00, area near twin 15" pipes under the canal; 191+00 to 194+00, across from the wide water basin area. There are several areas, especially east of the basin in which the concrete walls are cracked and have holes. In 1980 a hole was discovered in the concrete floor just east of the Rte. 254 bridge, at Station 199+00. This section has been filled with many clay patches. Also, fallen trees, sediment, and other debris have been deposited into the channel. The embankment is heavily overgrown with trees and brush, especially on the north side.

Recommendations

Monitor seepage from the embankment. If it increases to the point of being proolematic, rectify by one of standard recommended treatments. Clean channel and patch holes in walls and floor. Cut trees and brush on embankments. Contract work using a geomembrane liner is currently underway at approximately Station 194+00 to 196+00, just west of the basin. This has been an area where substantial leakage was occurring through the south slope.


MATCH LINE - K K
Limits of Geomembrane Liner
Contract D252276, 1988
FEEDER
193+59
187+04
183+13
MATCH LINE - J J
DAB-2A
PHB-1
WOW-2
WOW-1
AHB-11
PHB-1*
WOW-2
WOW-1
DAB-2A
AHB-11
R
-280
-270
-260
-250
ELEVATION - FT.
DATUM EL. 250
SCALE: 1" = 10' VERTICAL
NONE HORIZONTAL
* NO GROUND WATER RECORDED

Station	Section Length	Condition Classification
199+00 - 216+00	1,700 feet	3

Section Description

This section begins at the Rte. 254 bridge and continues to the end of the new sheet pile wall west of Ciba Geigy. The south wall consists of sheeting driven in front of the old wall with the void being filled with concrete installed in 1985 under Contract D251204. For a typical section, see Appendix D. Also, the waste weirs just west of Ciba Geigy were replaced under the same contract. The north wall and floor is comprised of concrete, and typical sections show the canal is constructed in cut with some embankment placed to the south. The canal section flows parallel and adjacent to the present Rte. 254.

Condition

The new south wall is in good condition. However, the north wall is cracked, broken with holes, has concrete facing missing, and is patched throughout the entire section.

Recommendations

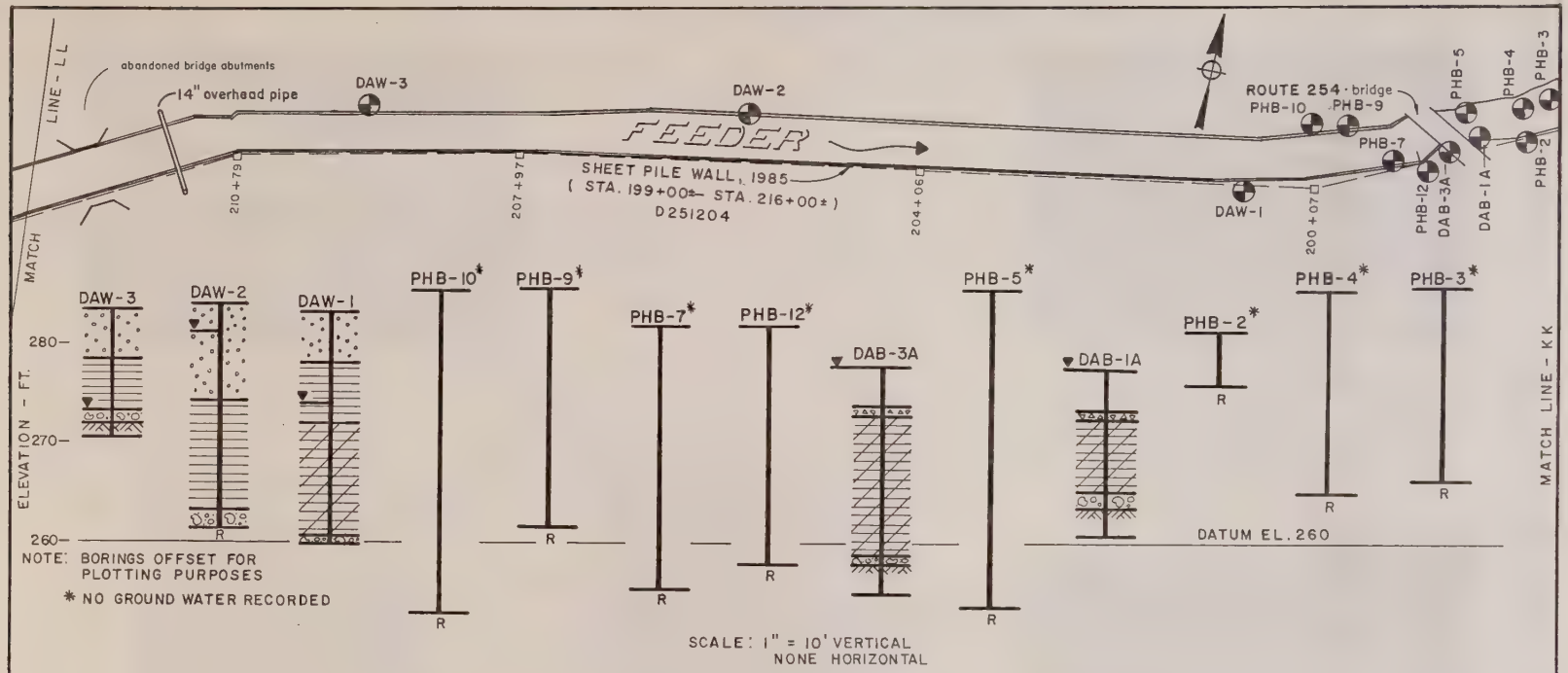
The condition of the north wall and the possible development of leaks should be monitored throughout the section. If leakage is occurring, the north wall should be patched or treated by other means. Also, consideration must be given to the fact that the highway is very near these walls and that failure of these walls could be hazardous. Clear trees and brush from north wall.

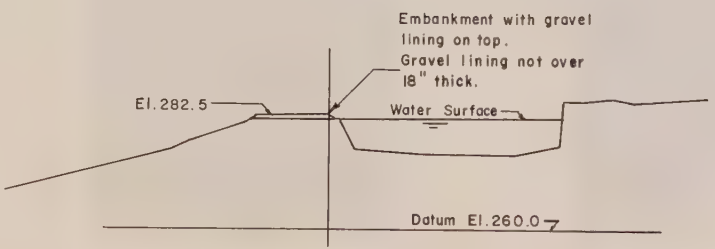
DETERIORATED NORTH WALL; sta. 205

MISSING CONCRETE FACING REVEALING THE LAID UP STONE; sta. 206

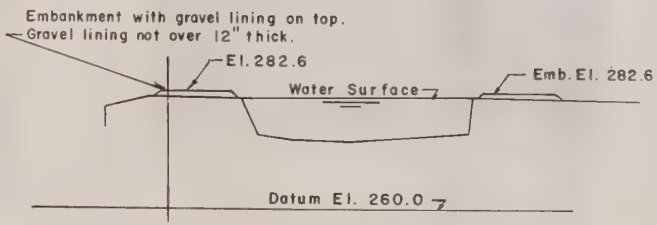
DETERIORATED NORTH WALL; sta 208

SHEET PILE WALL OF CIBA GEIGY PLANT; sta. 208





TYPICAL SECTION STA. 200+00 TO STA. 210+00
SCALE: 1"= 20'



TYPICAL SECTION STA. 210+00 TO STA. 232+00
SCALE: 1"= 20'

Station	Section Length	Condition Classification
216+00 - 220+00	400 feet	2

Section Description

This section extends from the end of the sheet pile wall to where the wall tapers to a smaller width, which is approximately 200 feet east of the stone box culvert. The typical section shows fill placed for the south outboard embankment and cut for the north side.

Condition

From station 218+00 to 220+00, the concrete facing on the north wall has dropped into the canal exposing the old stone wall. The south wall appears to be in good condition. A thick growth of trees and brush are present along the embankments. The north wall has trees and brush growing near the top of and actually through the wall.

Recommendations

First, the trees and brush should be cleared, especially where it is growing near and through the wall. Most likely the north wall will have to be repaired with a new facing to recover the recently exposed stone walls.

Station	Section Length	Condition Classification
220+00 - 223+20	320 feet	4

Section Description

Area of the stone box culvert which empties into the canal at station 221+00. The typical section is in cut for the north wall, and embankment material for the south wall.

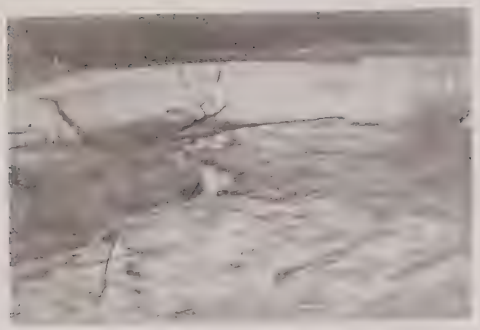
Condition

A large stream in conjunction with smaller streams was found exiting from the toe of the south embankment between stations 220+00 to 222+00. This is considered to be a major leak resulting in the loss of large quantities of canal water. Also, the concrete facing of the south wall is separated, from the stone behind it, one foot or more at the worst point. The embankments are covered by trees and brush. The north wall is the most critical with trees growing at the top and out of the wall. The channel is filled by many clay patches which were attempts to seal leaks.

Recommendations

This is the site of a Contract D252276 (1988) let for the installation of a geomembrane liner used to seal the leaks. This contract consists of the installation of the liner, and repair of the wall facing. For typical liner section, see Appendix D.

FALLEN CONCRETE FACING REVEALING THE LAID UP STONE WALL; sta. 220



PONDING AREA FORMED BY LEAKING CANAL WATER; sta. 221

LEAK AREA OF SOUTH WALL, NOTE CLAY PATCH; sta. 221

SEPARATION OF CONCRETE FACING AND LAID UP STONE WALL; sta. 223

CANAL WATER LEAKING TO POND AREA; sta. 221

Station	Section Length	Condition Classification
223+20 - 231+00	780 feet	2

Section Description

Begins at the end of the geomembrane and extends to the railroad bridge near the Iron Clad Cement Co. office. The typical section is in cut to the north and embankment for the south wall.

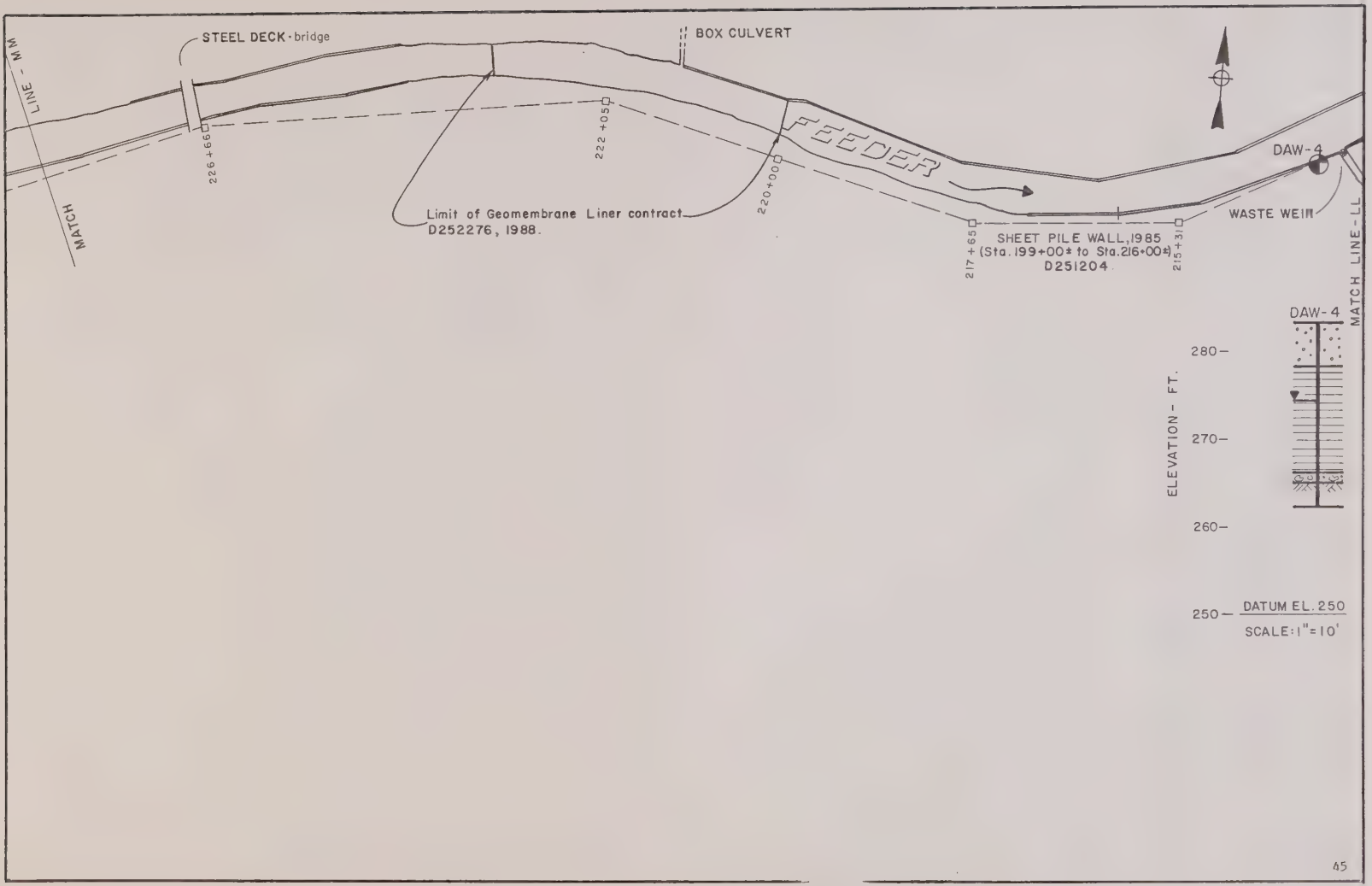
Condition

There is a substantial hole in the north wall at approximate station 225+00. The south wall has about a 100 foot clay patch which begins near the steel bridge leading into the cement storage yard and extends for nearly 100 feet to the west. However, there is no evidence of leakage. The north embankment is overgrown with small trees and brush. There is some debris in the canal, i.e., branches, leaves, garbage, and sediments.

Recommendations

The hole in the wall should be checked for leakage and patched if needed. The area of the clay patch should be monitored for leakage, and repairs made where needed. This may be a feasible site for the geomembrane liner, pending its performance from other sites. The trees and brush along the north embankment should be cleared, and the canal should be cleaned of all deleterious material.

CLAY PATCH AT SOUTH WALL; sta. 228


STEEL DECK · bridge
BOX CULVERT
LINE - MM
MATCH
226+66
222+05
220+00
FEEDER
DAW-4
WASTE WEIR
Limit of Geomembrane Liner contract
D252276, 1988.
217+65
215+31
SHEET PILE WALL, 1985
(Sta. 199+00± to Sta. 216+00±)
D251204
MATCH LINE - LL
DAW-4
ELEVATION - FT.
280
270
260
250
DATUM EL. 250
SCALE: 1" = 10'

Station	Section Length	Condition Classification
231+00 - 241+00	1,000 feet	3

Section Description

Begins at the railroad bridge near the Iron Clad office and extends through the plant ending at the entrance bridge. The typical section shows a combined cut and fill section; the cut being to the north and fill for the tow path embankment to the south.

Condition

This section is generally in good condition. It appears that the walls have been refaced in many areas. The cement company has maintained a roadway immediately adjacent to the south canal wall. Other than trees and brush on the north side, and some minor debris in the channel, the section is in good condition.

Recommendations

The trees and brush should be cleared from the canal embankments. Any debris should be cleaned from the channel.

WALLS IN GOOD CONDITION AT IRON CLAD OFFICE; sta. 233

WALLS IN GOOD CONDITION WEST OF THE CEMENT COMPANY ACCESS BRIDGE; sta. 240

Station	Section Length	Condition Classification
241+00 - 242+00	100 feet	4

Section Description

This is a site which has exhibited leakage, and has subsequently been patched with clay. This site is included in the geomembrane liner Contract D252276 (1988).

Condition

Before being patched with clay, serious leakage was occurring through the south embankment slope. However, at the time of our inspection, there was no leakage present. There are some trees and brush present along the north side. Stability of embankments is not a problem.

Recommendations

The liner should alleviate leakage problems at this site. The trees and brush should be cleared from the north walls and embankment. See detail for geomembrane liner Appendix D.

Station	Section Length	Condition Classification
242+00 - 249+00	700 feet	3

Section Description

Begins at liner area near entrance bridge to the cement company and extends to the bend at station 249+00. This section encompasses the site of an old failure of the south wall. The typical section shows the channel is formed by a cut to the north and fill along the south wall.

Condition

The concrete faced south wall is tipping toward the canal throughout much of the section. In many places, a distinct separation of the wall and backfill for the south towpath embankment is apparent.

The concrete facing has fallen off the south wall from approximate sta. 246+50 to 247+00. A clay berm against the inside of this wall acts as a patch. There is some cracking of the north wall. No leaks were found through the south embankment slope. Thick trees and brush are growing along the north wall, and some minor debris has fallen into the canal.

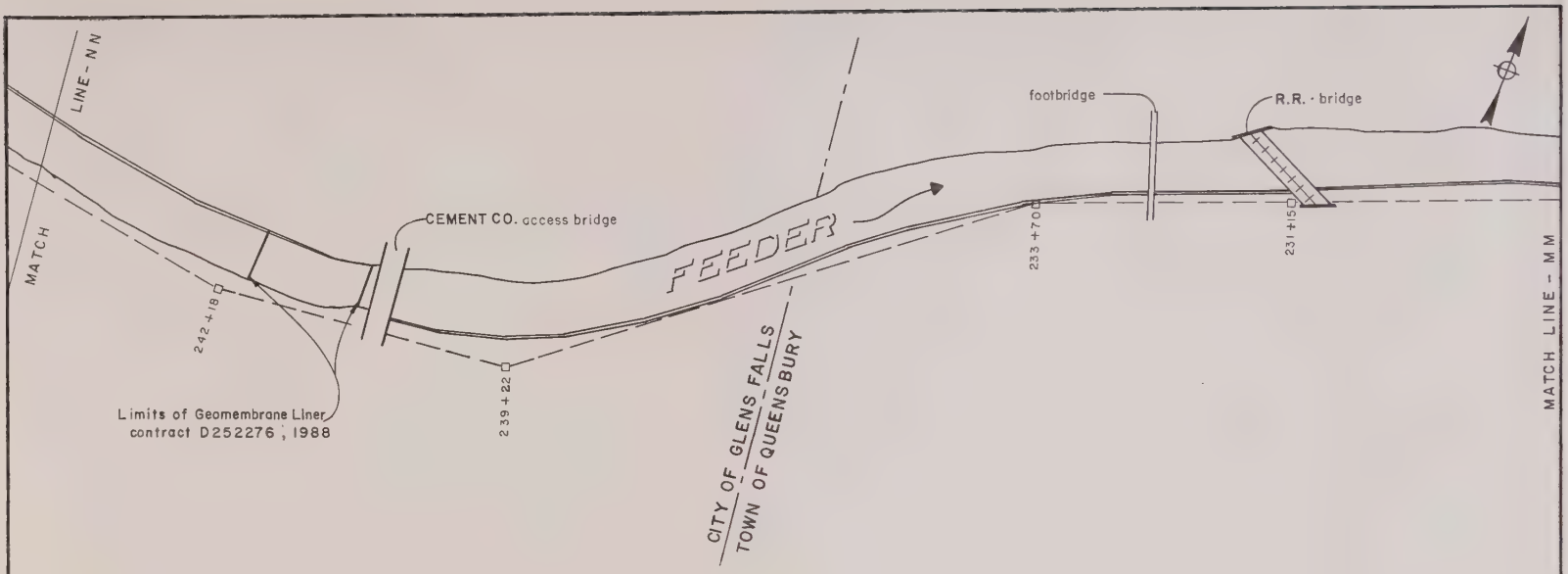
Recommendations

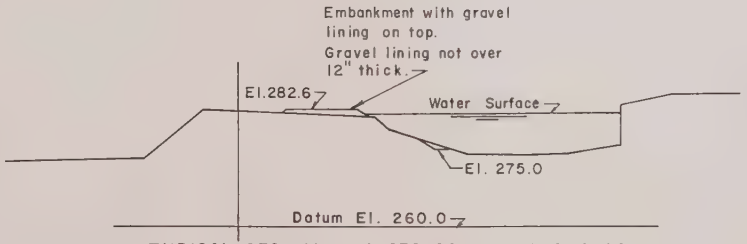
Monitor tne clay patched area along the south wall for leaks. Clear trees from top of wall and clean debris from canal.

CRACKED AND SPALLED NORTH WALL; sta. 246

SEPARATION OF CONCRETE FACING; sta. 247

MISSING CONCRETE FACING AND TIPPED WALL;
sta. 247





TYPICAL SECTION STA. 232+00 TO STA. 260+00
SCALE: 1" = 20'

Station	Section Length	Condition Classification
249+00 - 254+00	500 feet	3

Section Description

Begins at the end of the clay patch for the wall failure and extends to the old Shermantown Bridge. The typical section shows cut and fill for the north and south wall, respectively.

Condition

The concrete walls in this section are in reasonably good condition. There is a heavy growth of trees and brush along the north wall. Some debris is deposited in the channel.

Recommendations

The trees and brush should be cleared, and debris removed.

Station	Section Length	Condition Classification
254+00 - 256+69	269 feet	4

Section Description

Begins at old Shermantown Bridge and extends westerly for 269 feet. This is the site of a new concrete trough installed in 1981 under Contract D96869. Contract plans included in Appendix D.

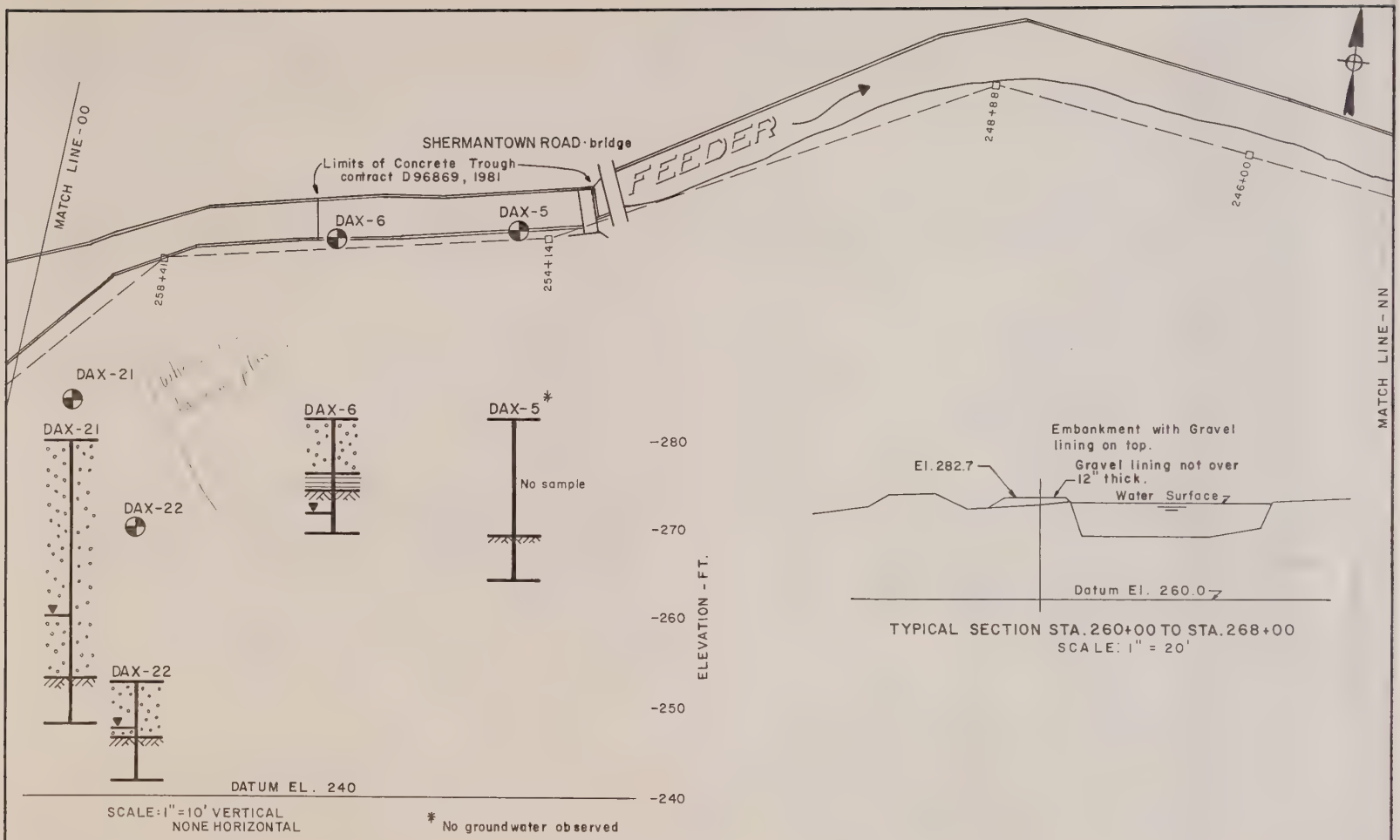
Condition

This new section is in excellent condition.

Recommendations

None

NORTH WALL OVERGROWN WITH TREES AND BRUSH; sta. 257


MATCH LINE - 00
SHERMANTOWN ROAD · bridge
Limits of Concrete Trough
contract D96869, 1981
FEEDER
DAX-6
DAX-5
258+41
254+14
248+88
246+00
MATCH LINE - NN
DAX-21
DAX-22
DAX-6
DAX-5 *
No sample
-280
-270
-260
-250
-240
ELEVATION - FT.
DATUM EL. 240
SCALE: 1" = 10' VERTICAL
NONE HORIZONTAL
* No groundwater observed
Embankment with Gravel
lining on top.
El. 282.7
Gravel lining not over
12" thick.
Water Surface
Datum El. 260.0
TYPICAL SECTION STA. 260+00 TO STA. 268+00
SCALE: 1" = 20'

Station	Section Length	Condition Classification
256+69 - 264+85	816 feet	3

Section Description

Begins at the end of the concrete trough near the Shermantown Bridge and extends to the bend near the rock crusher for the Jointa Lime Quarry. The canal is constructed in cut on the north side and some fill for the south slope.

Condition

The walls appear to be in fair condition, however, a few cracks, holes, and patches were noted. Some leakage was noted near the toe of slope at the intersection of the canal road and haul road (approximately station 262 ±). This section is shown to have concrete floors in Contract 56, but the integrity of these floors is unknown and questionable. Part of this section (station 262 ± to station 265+85 ±) was included in the area in which geophysical testing was performed by Weston Geophysical. This testing indicated possible leaks at station 262 and station 264+45. The tests used to determine leakage points and flow paths were the following: acoustic emissions, resistivity tests, and dye testing. Excerpts from the report summarizing these activities and results is included in Appendix C. Heavy vegetation has in many places fallen into the canal along the north wall.

Recommendations

The leaks should be monitored to check for fluctuation in intensity. At this time, they seem to be minor and pose no threat to embankment stability or property. The trees and brush along the north wall should be cleared.

Station	Section Length	Condition Classification
264+85 - 276+45	1,160 feet	4

Section Description

Begins at the bend near the rock crusher for the quarry and the remains of old bridge abutments, and extends to the beginning of the concrete walls and floors constructed in 1981 under Contract D96869. The canal prism is formed in cut through shallow sands and limestone and dolomite bedrock.

Condition

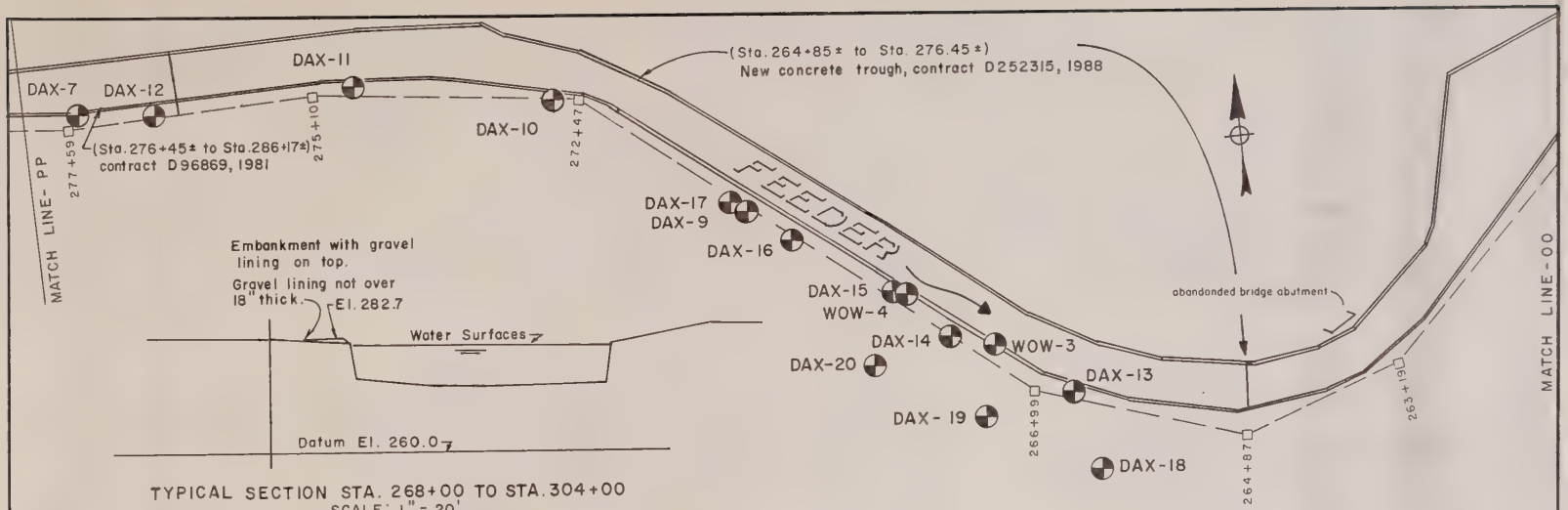
The section is currently being repaired by the construction of new concrete walls and floors under Contract D252315. It adjoins the previous rebuilt section under Contract D96869 in the Finch Pruyn area. Both of these Contracts are included in Appendix D.

The walls and floor in this section are severely spalled, cracked, and have holes penetrating their entire thickness. The site is characterized by a series of patches, i.e., clay and concrete patches. The leaks at this site have formed sink holes along the road, as well as several near a settling tank downslope from the railroad tracks. One particular leak is believed to flow to the Hudson River where water was found to exit the slope.

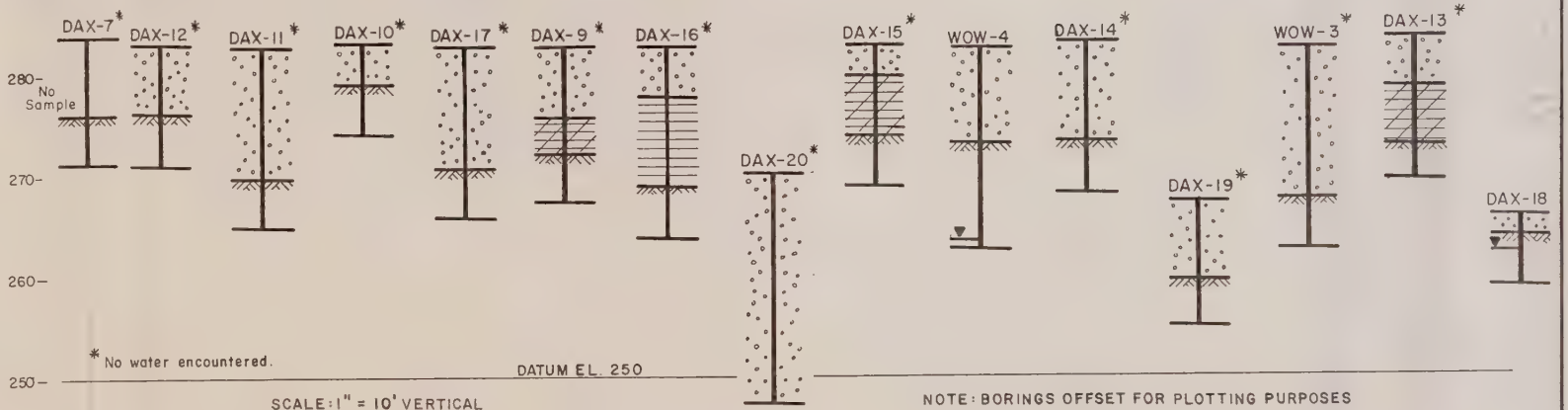
This site has undergone extensive geophysical testing, i.e., acoustic emissions, resistivity, and ground penetrating radar, in order to trace seepage flow paths.

Recommendations

None. Repairs are currently being performed under Contract D252315.



TYPICAL SECTION STA. 268+00 TO STA. 304+00
SCALE: 1" = 20'



* No water encountered.

SCALE: 1" = 10' VERTICAL
NONE HORIZONTAL

NOTE: BORINGS OFFSET FOR PLOTTING PURPOSES

Station	Section Length	Condition Classification
276+45 - 286+17	972 feet	4

Section Description

The section consists of approximately 972 feet of newly constructed concrete walls and floor in the Finch Pruyn area, immediately east of the entrance bridge over the Feeder Canal. The typical section is shown to be cut.

Condition

Since these walls and floors were newly constructed in 1981 and 1982, they are in good condition. As previously mentioned, this Contract D96869 is included in Appendix D.

Recommendations

None

Station	Section Length	Condition Classification
286+17 - 300+00	1,383 feet	4

Section Description

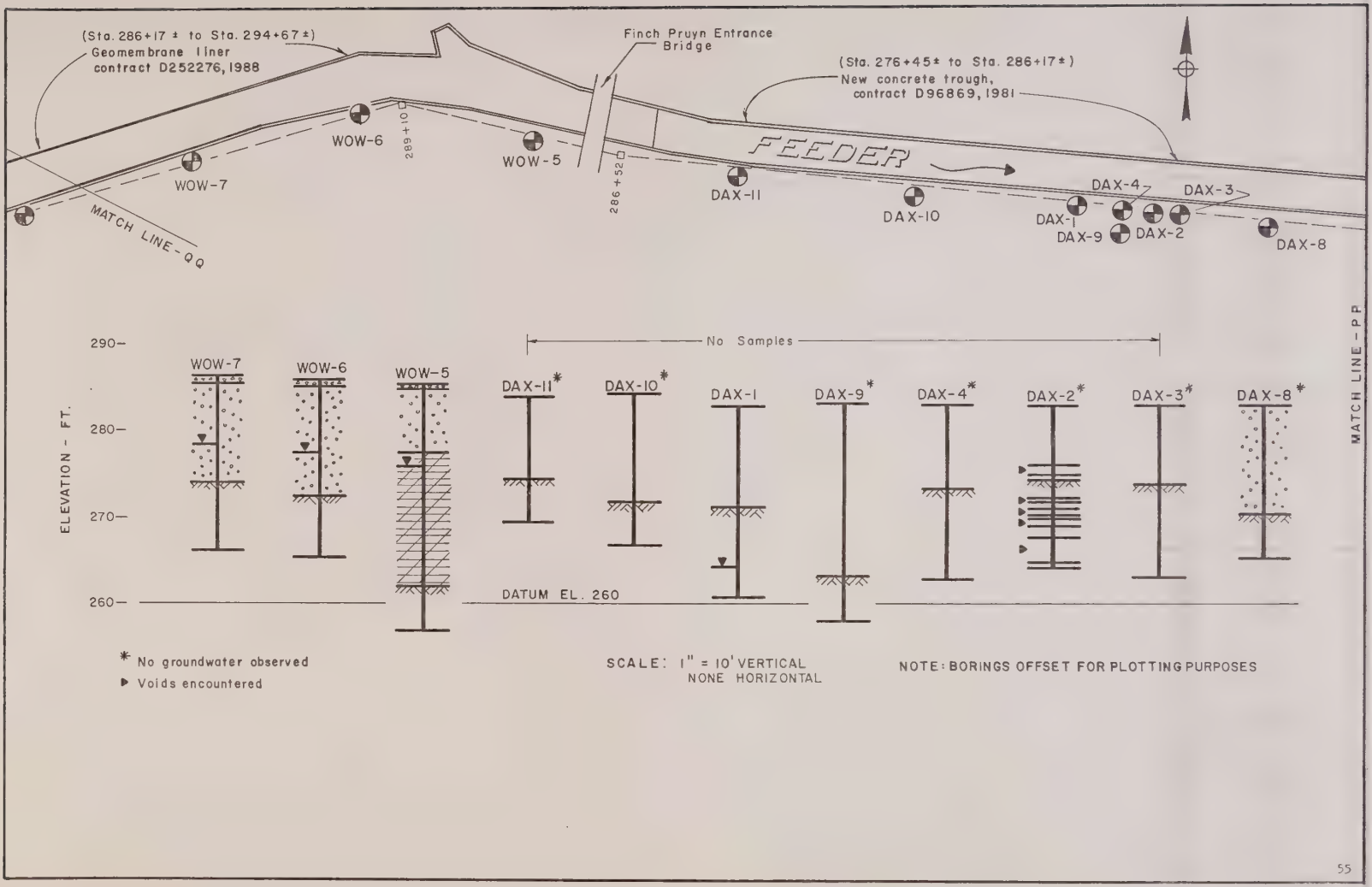
Begins just east of the Finch Pruyn entrance bridge and extends westerly through the Finch Pruyn property to the Route 9 Bridge, adjacent to Oakland Avenue. The typical section shows the canal to be constructed in cut.

Condition

Except for the new section of concrete wall in front of the Glens Falls Civic Center, this section is in poor condition with known leaks. Much of the section consists of concrete walls with laid up stone on top. In areas the stone has fallen and sloughing of the north embankment has occurred. The channel is filled with much debris, i.e., sediment, stone, garbage, etc. The south wall or floor has leaks which travel as far as the Finch Pruyn buildings to the south of the canal. Water was observed seeping from the south slope and up through the paved lot near the buildings. The quantity of leakage was greatly reduced when a concrete patch was placed at approximate station 289 $\pm$. Many concrete and clay patches were noted throughout the section. Due to the excessive leakage at this site, a geomembrane liner contract was let, Contract D252276, and is currently in construction. This contract consists of 850 feet of geomembrane liner with details included in Appendix D.

Recommendations

None


(Sta. 286+17 ± to Sta. 294+67 ±)
Geomembrane liner
contract D252276, 1988
Finch Pruyn Entrance
Bridge
(Sta. 276+45± to Sta. 286+17±)
New concrete trough,
contract D96869, 1981
FEEDER
WOW-6
WOW-7
WOW-5
286+10
286+52
DAX-11
DAX-10
DAX-4
DAX-3
DAX-1
DAX-9
DAX-2
DAX-8
MATCH LINE - QQ
MATCH LINE - PP
ELEVATION - FT.
290
280
270
260
No Samples
WOW-7
WOW-6
WOW-5
DAX-11*
DAX-10*
DAX-1
DAX-9*
DAX-4*
DAX-2*
DAX-3*
DAX-8*
DATUM EL. 260
* No groundwater observed
▶ Voids encountered
SCALE: 1" = 10' VERTICAL
NONE HORIZONTAL
NOTE: BORINGS OFFSET FOR PLOTTING PURPOSES

Station	Section Length	Condition Classification
300+00 - 302+50	250 feet	2

Section Description

This section begins at the Route 9 Bridge and extends westerly for 250 feet. The section is constructed entirely in cut.

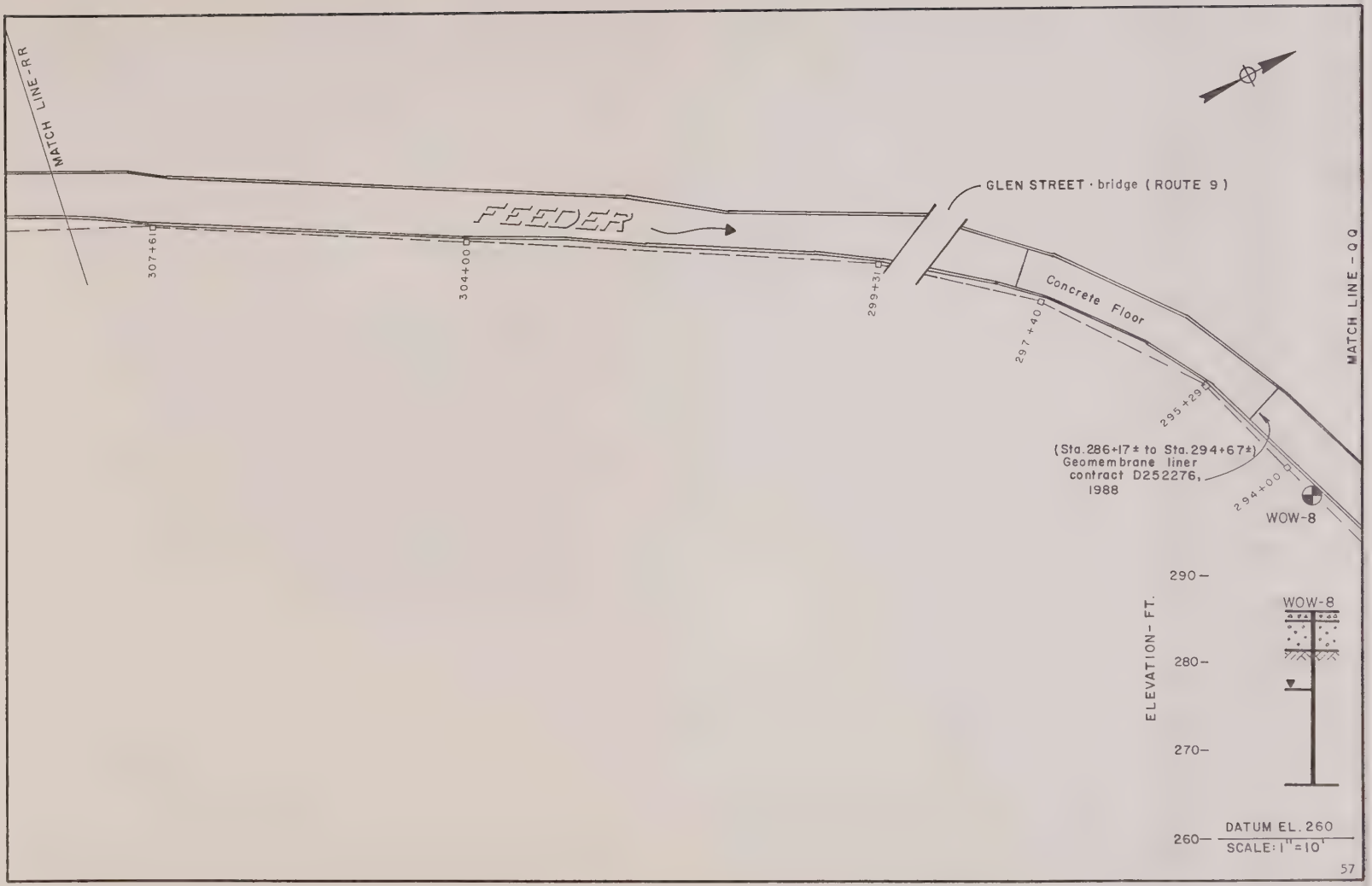
Condition

The south walls are constructed of concrete which are severely spalled, weathered, cracked, and have holes in them. In many places, the concrete face has fallen off entirely exposing the laid up stone. To the north, the stone wall has collapsed near the center of the section. The canal is cluttered with debris, i.e., sediment, logs, and garbage. The north wall is overgrown with trees and brush.

Recommendations

The walls should be repaired to prevent leakage and sloughing of the inboard slopes. Appropriate treatment should be chosen from the summary of recommended treatments. The trees and brush should be cleared from the slopes.

LAID UP STONE WALL COLLAPSING.
LOOKING UPSTREAM FROM STA. 299.


MATCH LINE - RR
FEEDER
307+61
304+00
299+31
GLEN STREET · bridge (ROUTE 9)
Concrete Floor
297+40
295+29
294+00
(Sta. 286+17± to Sta. 294+67±)
Geomembrane liner
contract D252276,
1988
WOW-8
MATCH LINE - QQ
ELEVATION - FT.
290
280
270
260
DATUM EL. 260
SCALE: 1" = 10'

Station	Section Length	Condition Classification
302+50 - 324+00	2,150 feet	3

Section Description

Begins just west of the Route 9 bridge and extends south westerly to a point approximately 400 feet southwest of the Murray Street bridge. Throughout this section, the southeast wall is comprised of concrete, while the northwest side is earth slopes with an area of stone wall near the Route 9 bridge. The typical section shows that the canal prism is constructed in cut.

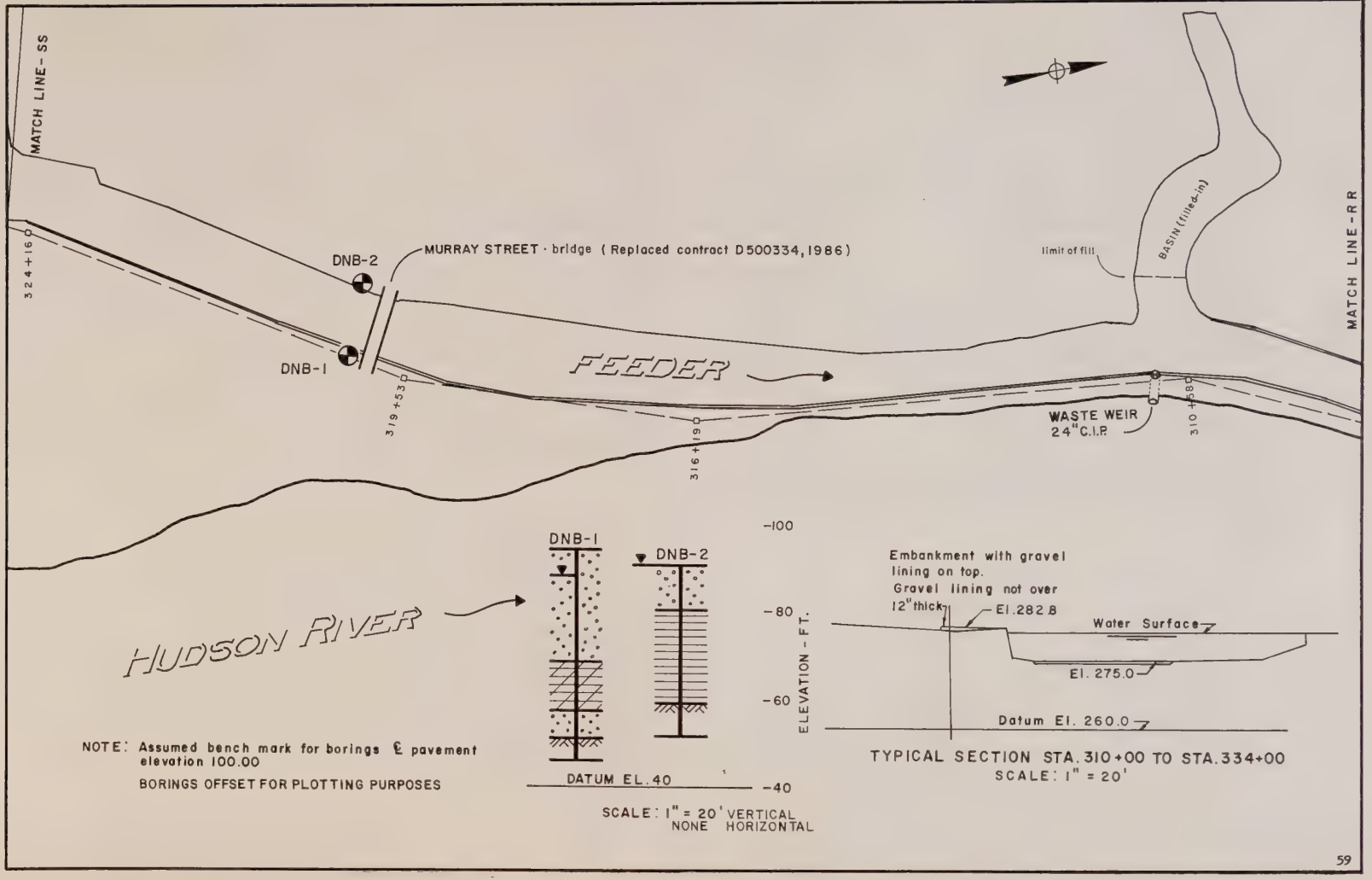
Condition

Except for minor cracks and holes, the south concrete wall is generally in good condition. The stone wall to the north has failed in some areas near the Route 9 bridge. Primarily, the north side is comprised of natural earth slopes which have exhibited sloughing due to the nature of the natural fined grained soils. There appears to be a large accumulation of bottom sediments in the canal, especially near the Murray Street bridge. Also, there is some vegetation encroaching on the walls, primarily along the north side. At station 310+80, the waste weir was found to be open, and it was discharging at 75% capacity through a 24 inch pipe into the Hudson River.

Recommendations

Repair waste weir. Clear trees and brush from wall areas. Check extent of sediment accumulation in canal bottom. Monitor walls and earth slopes for any movement or the development of leaks.

WASTE WEIR LEAKING INTO THE HUDSON RIVER; sta. 310+80


MATCH LINE - SS
MATCH LINE - RR
324+16
DNB-2
MURRAY STREET · bridge (Replaced contract D500334, 1986)
DNB-1
319+53
316+19
FEEDER
limit of fill
BASIN (filled-in)
WASTE WEIR
24" C.I.P.
310+80
HUDSON RIVER
DNB-1
DNB-2
-100
-80
-60
-40
ELEVATION - FT.
DATUM EL. 40
SCALE: 1" = 20' VERTICAL
NONE HORIZONTAL
Embankment with gravel lining on top.
Gravel lining not over 12" thick
El. 282.8
Water Surface
El. 275.0
Datum El. 260.0
TYPICAL SECTION STA. 310+00 TO STA. 334+00
SCALE: 1" = 20'
NOTE: Assumed bench mark for borings & pavement elevation 100.00
BORINGS OFFSET FOR PLOTTING PURPOSES

Station	Section Length	Condition Classification
324+00 - 354+00	3,000 feet	3

Section Description

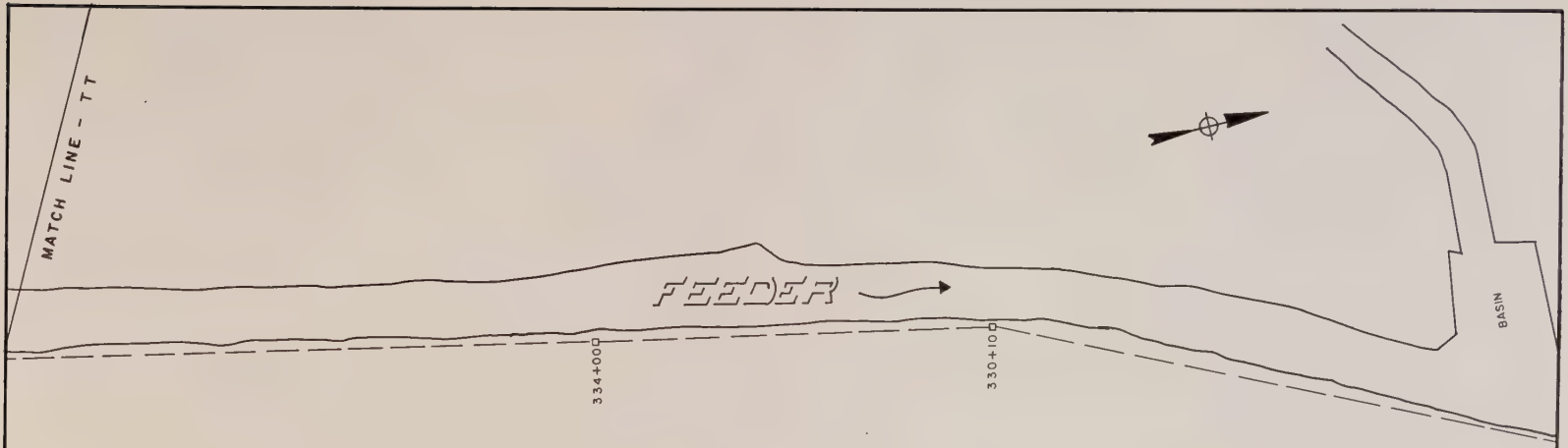
Begins approximately 400 feet southwest of the Murray Street bridge and extends southerly past the bend with old bridge abutments. The canal prism is cut into fine grained alluvium soil.

Condition

This section is cut through the native fine grained material, without the use of walls resulting in some sloughing of the inboard slopes. However, there were no areas of leakage noted. There is heavy growth of trees and brush adjacent to the channel throughout the section.

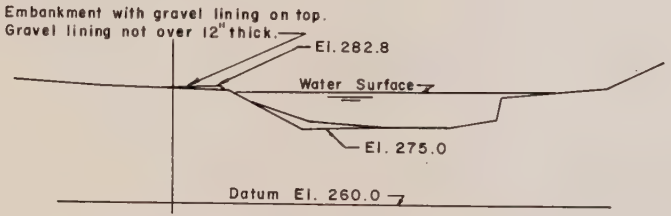
Recommendations

Reshape channel to obtain adequate dimensions and inboard slope stability. Stone lining of the channel would allow the use of steeper slopes, while still maintaining stability. Clear the trees and brush from slopes.

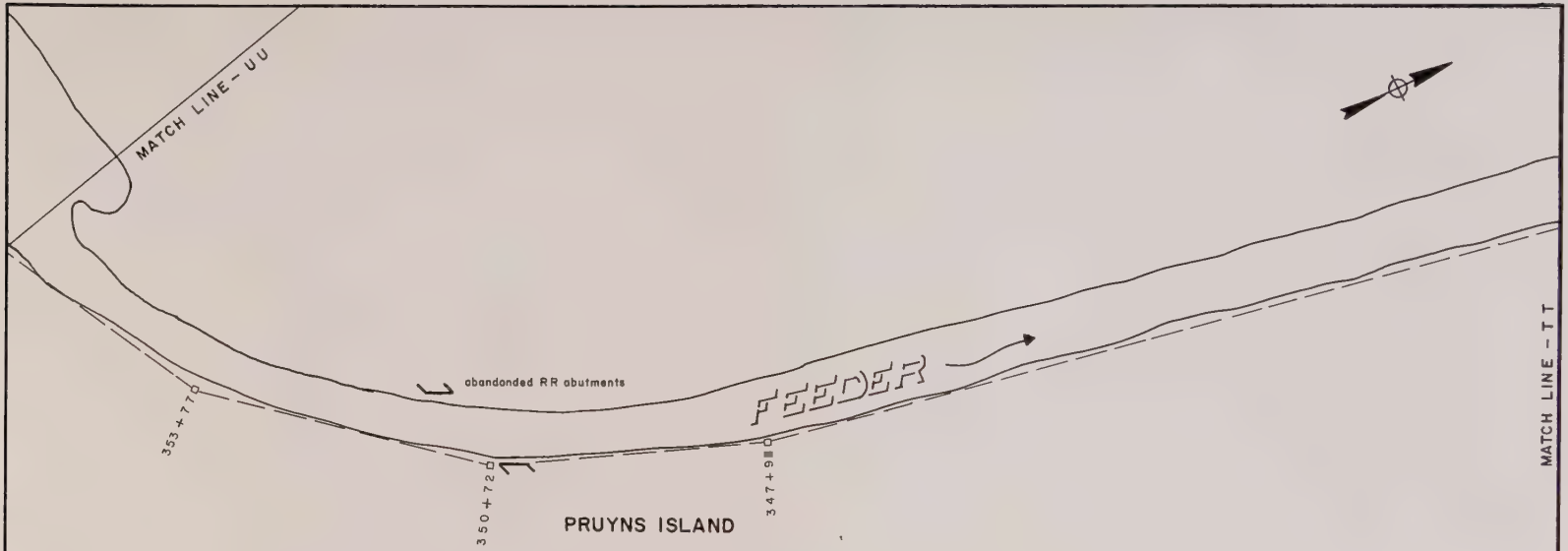


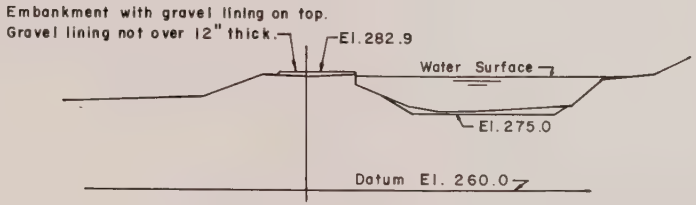
PRUYNS ISLAND

MATCH LINE - S S



TYPICAL SECTION STA. 334+00 TO STA. 340+00
SCALE: 1" = 20'





TYPICAL SECTION STA. 340+00 TO STA. 370+00
SCALE: 1" = 20'

Station	Section Length	Condition Classification
354+00 - 381+00	2,700 feet	3

Section Description

Begins past the bend with old bridge abutments and continues westerly to a point about 900 feet past the Bush Street bridge. The north side of the prism is constructed in cut, while the south side is constructed in cut with some fill.

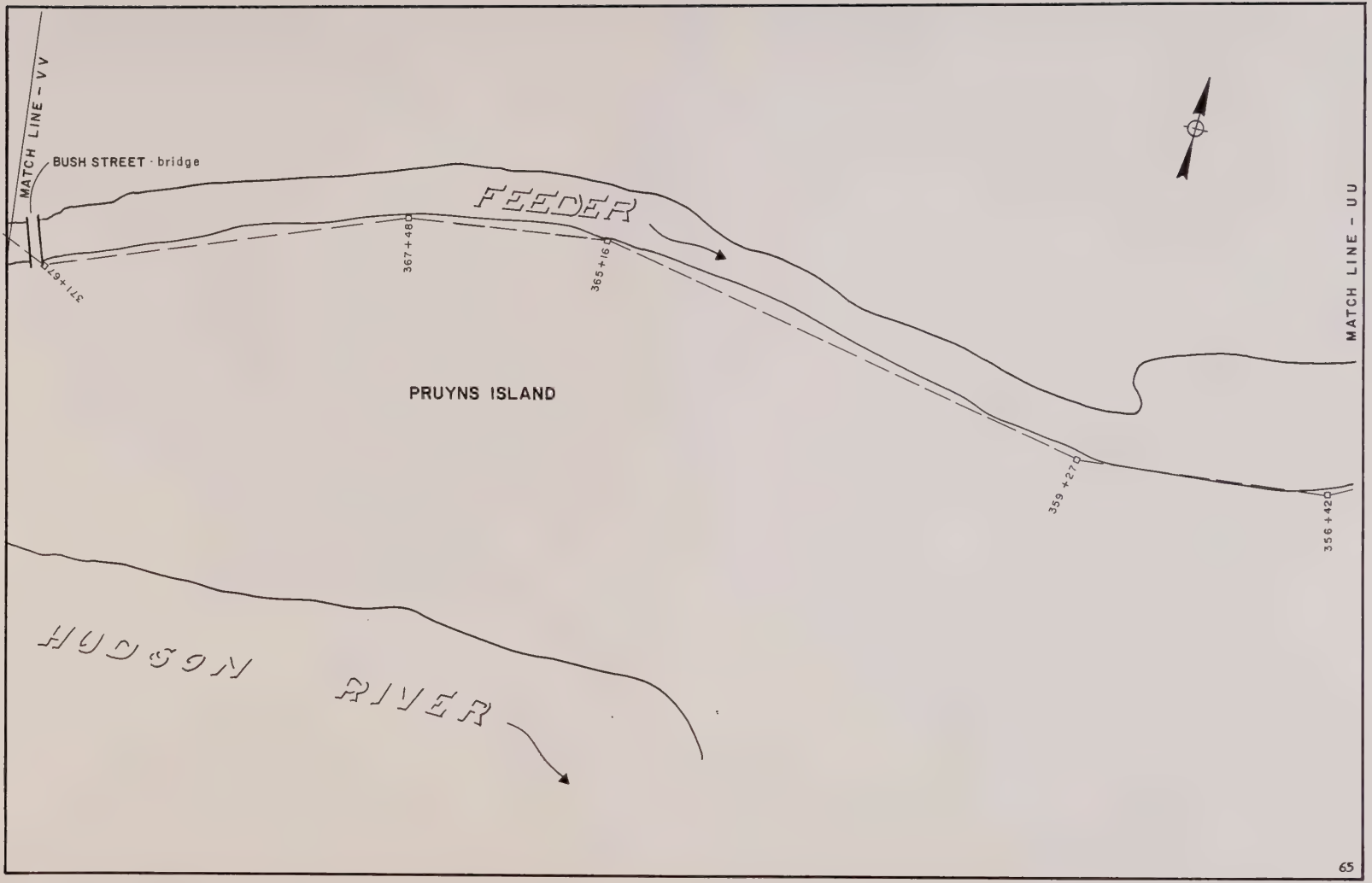
Condition

This section is in good condition. The north slopes are cuts with some areas of fallen stone lining. The south inboard slope shows fallen remnants of timber walls and stone. There is some minor sloughing of inboard slopes. Trees and brush encroach on the canal throughout the section, primarily along the north wall.

Recommendations

Trees and brush should be cleared from the slopes. If the facilitation of easier, smoother, and slower flow is desired, the channel should be shaped to obtain a larger, deeper channel.

BRUSH AND DEBRIS IN CHANNEL. LOOKING DOWNSTREAM FROM STA. 364.


MATCH LINE - VV
BUSH STREET · bridge
FEEDER
371+67
367+48
365+16
359+27
356+42
PRUYNS ISLAND
MATCH LINE - UU
HUDSON RIVER

Station	Section Length	Condition Classification
381+00 - 383+00	200 feet	2

Section Description

Located approximately 1,000 feet west of the Bush Street bridge, this is the site of a "blowout" through the laid up stone wall which occurred about 10 years ago. There is no written record describing the details of this reconstruction.

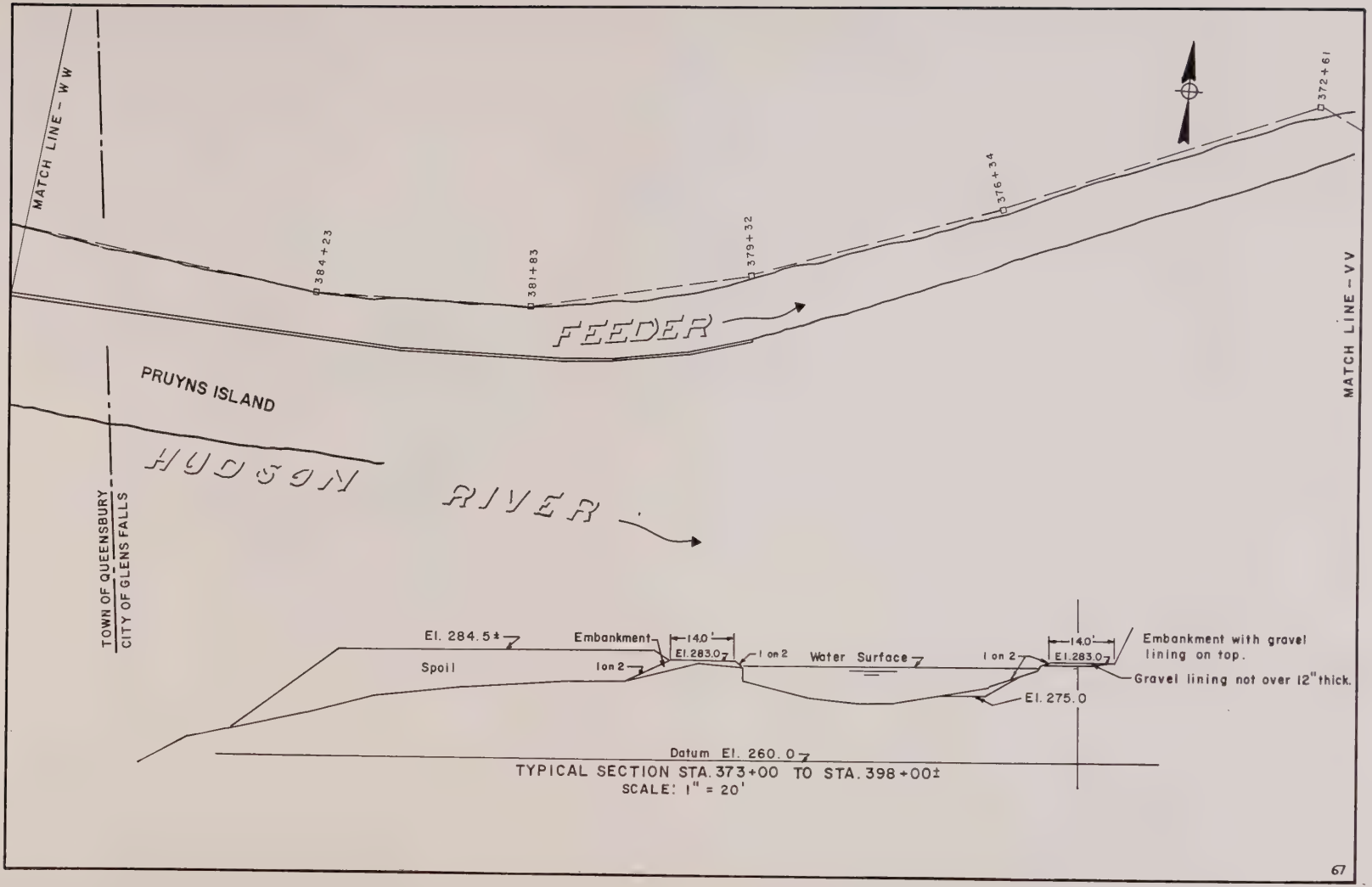
Condition

The area is characterized by a clay berm placed along the inboard side of the south wall. The clay patch extends for approximately 200 feet laterally and to the top of the wall. The patch is about 6 feet high with a slope of 1 on 1 into the canal. Leakage was noted in several places along the toe of the outboard slope at this location. Also, subsidence was present on the towpath adjacent to this patch. There is a defined dip of approximately 1 foot along this length of the towpath. Dye testing was used unsuccessfully to define the leakage traces.

Recommendations

The leaks could be treated by the installation of geomembrane liner throughout this area depending on the success of the present contracts. The outboard slope, which is currently about a 1 on 1, should be flattened and lined with geotextile to control the migration of fines. Trees and brush should be removed.

LOOKING TOWARD BUSH STREET FROM STA. 380. NOTE END OF STONE WALL.


MATCH LINE - W W
384+23
381+83
379+32
376+34
372+61
FEEDER
PRUYNS ISLAND
HUDSON RIVER
MATCH LINE - V V
TOWN OF QUEENSBURY
CITY OF GLENS FALLS
El. 284.5±
Embankment
14.0'
El. 283.0
1 on 2
Water Surface
Spoil
1 on 2
1 on 2
14.0'
El. 283.0
Embankment with gravel lining on top.
Gravel lining not over 12" thick.
El. 275.0
Datum El. 260.0
TYPICAL SECTION STA. 373+00 TO STA. 398+00±
SCALE: 1" = 20'

Station	Section Length	Condition Classification
383+00 - 398+77	1,577 feet	3

Section Description

Begins at the former "blowout" area and extends to the dam at the site of former Lock 14. The north side of the canal prism is constructed in cut, while the south side is constructed in cut with some additional fill.

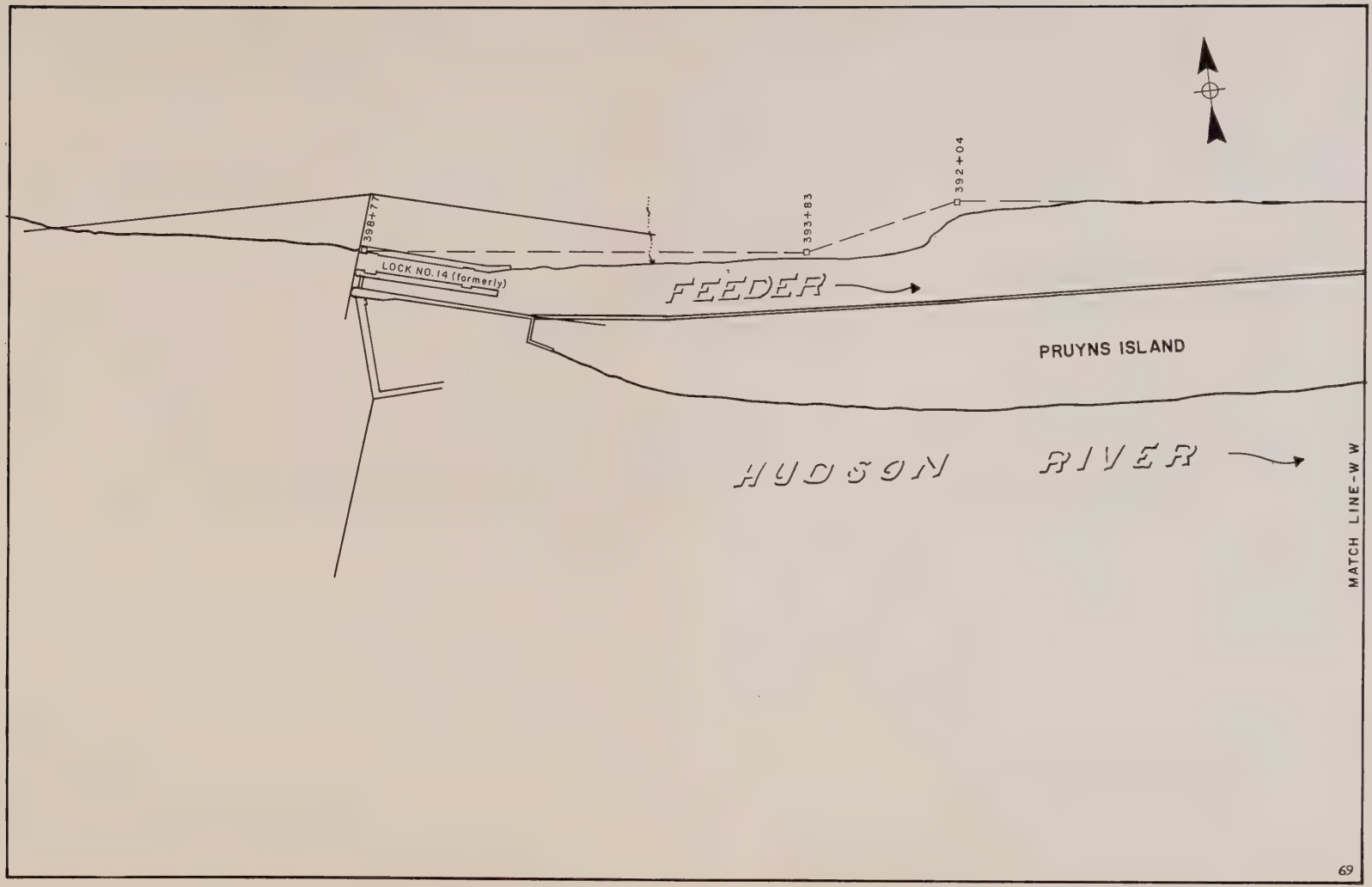
Condition

The south wall constructed of stone is in good condition, except for trees which have grown through it. The north wall is cut into natural material and is in good condition. The slopes are covered with trees and brush.

Recommendations

Monitor soutn outboard slopes for leakage. These slopes are oversteepened and may be prone to leakage. Clear trees and brush from embankments.

VIEW OF CLAY BERM AT "BLOW OUT" SITE.
NOTE FEEDER DAM IN BACKGROUND. Sta. 380


398+77
LOCK NO. 14 (formerly)
393+83
392+04
FEEDER
PRUYNS ISLAND
HUDSON RIVER
MATCH LINE - W W

APPENDIX A: TERRAIN RECONNAISSANCE

AREA DESCRIPTION

The Glens Falls Feeder originates at the Hudson River, just east of the Northway, I-87, and flows almost parallel with the river before emptying into the Old Champlain Canal. The Old Champlain Canal then flows north to Dunham Basin where it turns easterly and flows into the present day Champlain Canal, supplying a source of water for the summit level. The Feeder travels through Glens Falls and Hudson Falls in Southern Warren and Washington County, respectively. The route from the Feeder dam to the point of exit into the Old Champlain Canal is approximately 7.0 miles. The 5.8 mile section from the canal's origin at the Feeder Dam to Pearl Street is nearly level. At this point, the canal begins its decent, dropping nearly 140 feet through a series of old locks, before reaching the summit level.

PHYSIOGRAPHY

Situated in the Hudson-Champlain Lowlands physiographic province, the area lies in an eroded trough of generally low relief reflecting a continuous peneplain. This trough was formed in Precambrian times by the raising of the Adirondacks and Green Mountains. The trough was later modified by localized, long term erosion, resulting in weaker rocks sandwiched by strong rocks. Once the drainage began, the region was again uplifted, and a great valley was formed on the older and softer rocks forming the present day Hudson River. The presence of a rock terrace along the Hudson indicates this uplift.

The general aspect of the area is that of a sandy plain with clay flats at the lower elevations. This delta plain is dissected by the Hudson River incising into the bedrock resulting in rock cliff areas. The elevations increase moving west from the Champlain Canal toward the Feeder dam, varying from approximately EL150 to EL300.

GEOMORPHOLOGY

This area was covered many times with glacial ice several thousand feet thick. These glaciers pushed southward over New York State, rounding the hills and riages of resistant rock. Rocks and debris were picked up and mixed and ground down as the glacier moved southward. During this period, the gorge of the Hudson at the entrance to the highlands was deepened by several hundred feet.

As the ice melted, lakes formed when water became trapped in lowlands between the ice front and the nigher bedrock hills and moraines. Most of this Hudson-Champlain Lowland was occupied by glacial lakes Albany and Vermont. Consequently, many of the soils in this area are glacial meltwater deposits. As the fast moving Hudson River flowed into Lake Vermont, sands were dropped first creating large deltas. The finer grained silts and clay were carried further out into these lakes, but in time settled out to form the lacustrine bottom sediments. There are also areas mapped as outwash deposits where large streams sorted out the finer particles depositing sands and gravels. As the glacier continued to recede it left behind the ground-up rock material of glacial till. Other areas have been scraped by the glacier exposing the bedrock.

ROCK FORMATION

The soil is underlain by Paleozoic Rock consisting of sandstone, limestone, shale, and dolostone. The corresponding rock formations encountered are the Snake Hill Shale Formation, Beckmantown Group carbonates, and Undifferentiated Trenton group. These rocks are deposited onto the edge of, and over the top of the old Precambrian land mass of the Adirondacks. The carbonates in the Glens Falls area, which are down-faulted, are now mostly covered by deposits related to the great Pleistocene Glaciers.

DRAINAGE

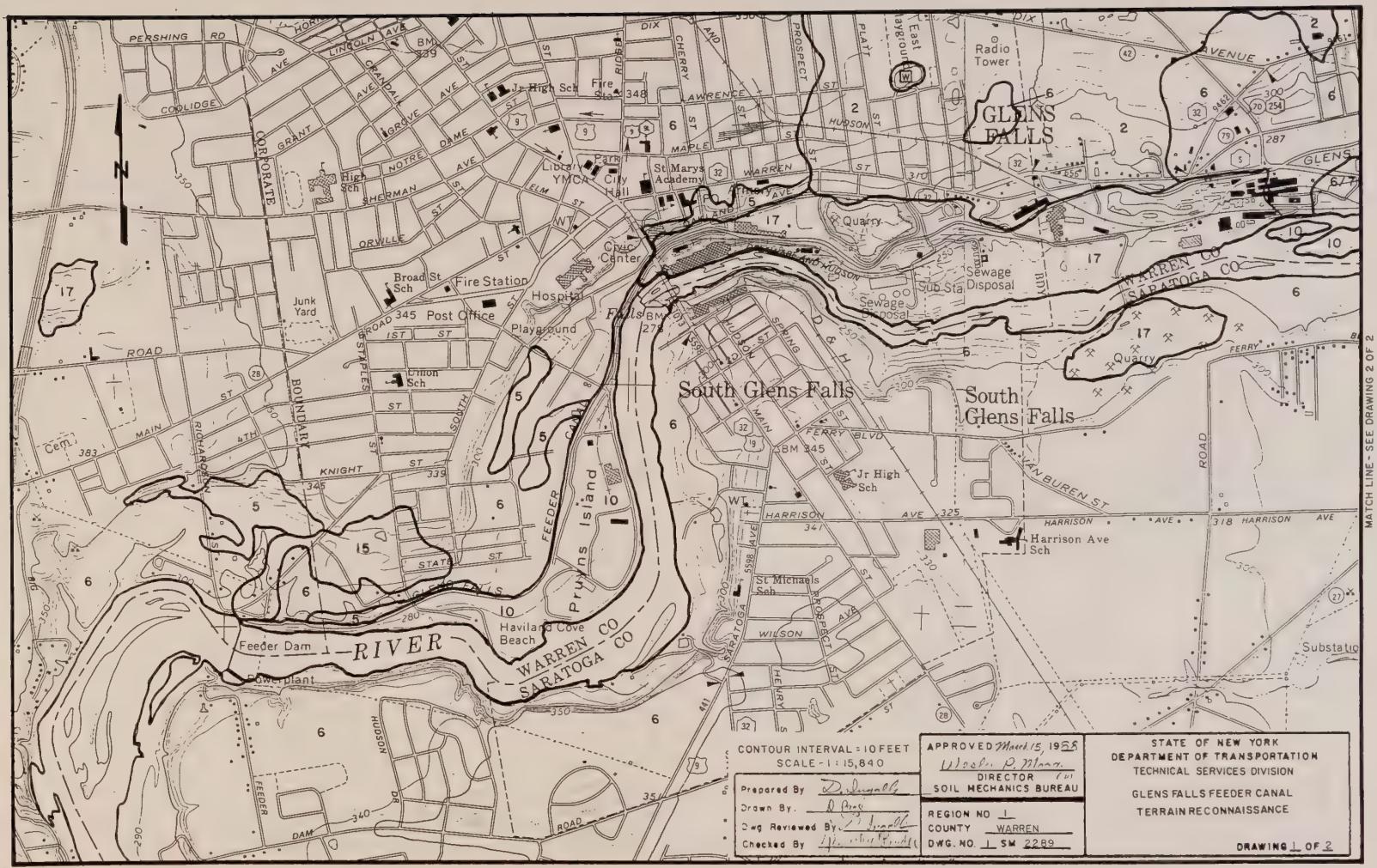
The two main drainage basins that occupy this area are the Hudson and Champlain. The northern reaches are drained by Lake Champlain and the St. Lawrence River to the Atlantic Ocean. South of the divide that crosses midway between the two counties, the drainage is to the Hudson River, emptying into the Atlantic Ocean. Some of the Champlain Lowlands is drained by Wood Creek which is located east of the Feeder Canal. Bond Creek drains the Kingsbury water shed and flows into the canal at Dunham Basin. Additionally, Cold Brook carries water from the north to the Hudson Falls Reservoir, crossing the canal via a stone box culvert.

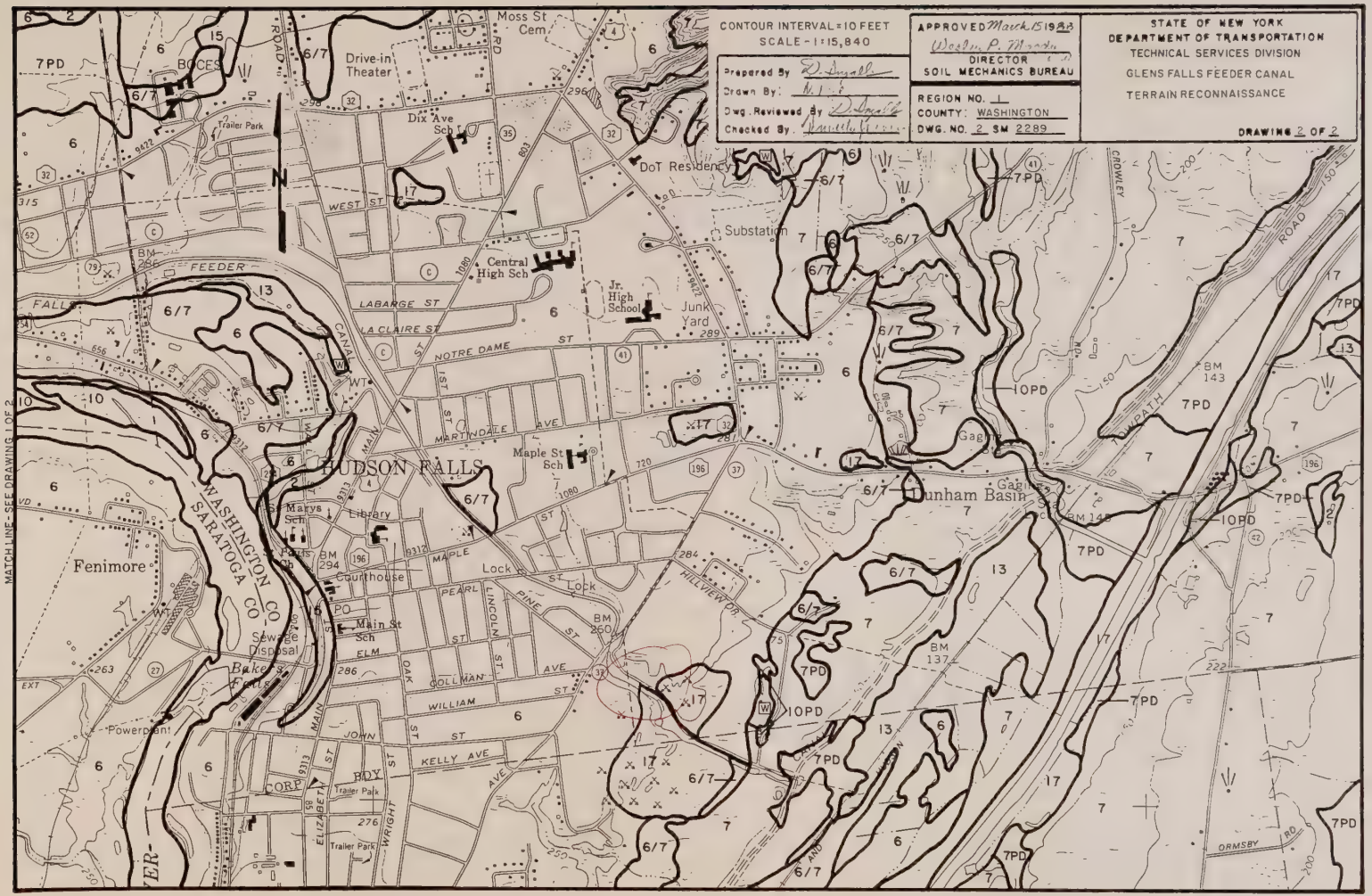
2	THIN TILL
5	OUTWASH DEPOSITS
6	LACUSTRINE SHORE DEPOSITS
6/7	LACUSTRINE SHORE DEPOSITS OVER LACUSTRINE BOTTOM SEDIMENTS
7	LACUSTRINE BOTTOM SEDIMENTS
10	RECENT ALLUVIAL DEPOSITS
13	ORGANIC DEPOSITS
15	BEDROCK OUTCROP
17	MAN-MADE FEATURES
\!/	WET SPOT
\\\///	MARSH
W	STANDING WATER
PD	POORLY DRAINED VARIANT

SCALE 1:15840

1 1/2 0 1 MILE

CONTOUR INTERVAL 10 FT


GLENS FALLS
South Glens Falls
South Glens Falls
Pruyns Island
Haviland Cove Beach
Feeder Dam
Powerplant
RIVER
WARREN CO
SARATOGA CO
Radio Tower
Sewage Disposal
Sub Sta
Quarry
Civic Center
Hospital
Playground
Fire Station
Post Office
Junk Yard
Broad St Sch
Union Sch
High Sch
Jr High Sch
Library
YMCA
City Hall
St Marys Academy
Armory
Harrison Ave Sch
St Michaels Sch
Substatio
MATCH LINE - SEE DRAWING 2 OF 2
CONTOUR INTERVAL = 10 FEET
SCALE - 1 : 15,840
Prepared By
Drawn By
Dwg Reviewed By
Checked By
APPROVED March 15, 1988
DIRECTOR
SOIL MECHANICS BUREAU
REGION NO 1
COUNTY WARREN
DWG. NO. 1 SM 2289
STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION
TECHNICAL SERVICES DIVISION
GLENS FALLS FEEDER CANAL
TERRAIN RECONNAISSANCE
DRAWING 1 OF 2


CONTOUR INTERVAL = 10 FEET
SCALE - 1:15,840
Prepared By
Drawn By:
Dwg. Reviewed By
Checked By
APPROVED March 15 1983
DIRECTOR
SOIL MECHANICS BUREAU
REGION NO. 1
COUNTY: WASHINGTON
DWG. NO. 2 SM 2289
STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION
TECHNICAL SERVICES DIVISION
GLENS FALLS FEEDER CANAL
TERRAIN RECONNAISSANCE
DRAWING 2 OF 2
MATCH LINE - SEE DRAWING 1 OF 2
HUDSON FALLS
Fenimore
Dunham Basin
Moss St Cem
Drive-in Theater
BOCES
Trailer Park
Dix Ave Sch
DoT Residency
Substation
Central High Sch
Jr. High School
Junk Yard
Maple St Sch
Library
Courthouse
Main St Sch
Sewage Disposal
Baker's Falls
Powerplant
Lock
WASHINGTON CO
SARATOGA CO
FEEDER
CANAL
WEST ST
LABARGE ST
LA CLAIRE ST
NOTRE DAME ST
MARTINDALE AVE
MAPLE ST
PEARL ST
LINCOLN ST
PINE ST
ELM ST
OAK ST
COLLMAN AVE
WILLIAM ST
JOHN ST
KELLY AVE
HILLVIEW DR
CROWLEY RD
TOWPATH ROAD
ORMSBY RD
ELIZABETH ST
WRIGHT ST
MAIN ST
BM 286
BM 294
BM 260
BM 137
BM 143
BM 148
7PD
10PD
6/7
13
17
7

GENERAL TERRAIN UNIT CHARACTERISTICS

SYMBOL	TERRAIN UNITS	MODE OF ORIGIN	LANDFORM	COMMON TOPOGRAPHIC POSITION	PARTICLE SIZE AND DISTRIBUTION	RELATIVE PERMEABILITY	REMARKS
2	THIN TILL	SEDIMENTS PICKED UP, TRANSPORTED MIXED, AND DEPOSITED BY GLACIAL ICE, MINIMAL WATER TRANSPORT. COMPACTION BY OVERRIDING ICE OR SETTLING DURING DEWATERING.	NEARLY LEVEL TO MODERATELY STEEP. TILL PLAINS AND VALLEY SIDES. LAND-FORMS MAY BE BEDROCK CONTROLLED.	TILL PLAINS, INCISED DRAINAGE WAYS, FLANKS AND TOPS OF HILLS.	CLAY TO BOULDERS, GENERALLY UNSORTED AND UNSTRATIFIED MINOR WATER SORTED POCKETS. THE SOILS VARY IN COMPOSITION ACCORDING TO THE ROCK FROM WHICH THEY WERE DERIVED.	V. SLOW TO RAPID.	DEPTH TO BEDROCK LESS THAN FOUR FEET. NUMEROUS ROCK FRAGMENTS NEAR BEDROCK SURFACE. THE UNDERLYING BEDROCK MAY CONTROL THE LAND-FORM.
5	OUTWASH DEPOSITS	SEDIMENTS TRANSPORTED BY MELTWATERS AWAY FROM ICE MASS.	FLAT TO GENTLY UNDULATING TERRACES AND PLAINS.	LOWER VALLEY WALLS AND FLOORS.	CLAY THROUGH COBBLES, SAND AND GRAVEL PREDOMINATE. WELL-SORTED, MASSIVE, NEARLY HORIZONTAL STRATIFICATION.	MODERATE TO VERY RAPID.	MOSTLY NON-PLASTIC
6	LACUSTRINE SHORE DEPOSITS	SEDIMENTS TRANSPORTED BY WATER COURSES FLOWING INTO GLACIAL LAKES AND SETTLING. WAVE ACTION ALONG SHORES.	DELTAS, BEACHES AND BARS. FLAT TO GENTLY UNDULATING PLAINS.	HIGH ON VALLEY WALLS, EDGE OF VALLEY FLOORS. EDGES OF LOWLANDS.	CLAY THROUGH COBBLES, SILT AND SAND PREDOMINATE. WELL-SORTED BEDS. NEARLY HORIZONTAL, DISTINCT STRATIFICATION.	MODERATELY SLOW TO RAPID.	MOSTLY NON-PLASTIC MAY OVERLIE SILT AND CLAY OR TILL.
6/7	LACUSTRINE SHORE DEPOSITS OVER LACUSTRINE BOTTOM SEDIEMENTS	SEE CHARACTERISTICS FOR EACH TERRAIN UNIT.					SAND AND SILT COVER LESS THAN 3 FEET THICK OVER SILT AND CLAY.
7	LACUSTRINE BOTTOM SEDIMENTS	SEDIMENTS DEPOSITED IN DEEP, QUIET WATER OF GLACIAL LAKES.	FLAT TO GENTLY UNDULATING PLAINS.	ON KNOBS AND DEPRESSIONS OF VALLEY FLOORS AND LOWLANDS.	CLAY TO FINE SAND, MOSTLY SILT AND CLAY. WELL-SORTED BEDS. NEARLY HORIZONTAL, DISTINCT STRATIFICATION.	VERY SLOW VERTICALLY, SLOW HORIZONTALLY.	LAMINATIONS COMMONLY CALLED VARVES. HIGHLY PLASTIC.

GENERAL TERRAIN UNIT CHARACTERISTICS

SYMBOL	TERRAIN UNITS	MODE OF ORIGIN	LANDFORM	COMMON TOPOGRAPHIC POSITION	PARTICLE SIZE AND DISTRIBUTION	RELATIVE PERMEABILITY	REMARKS
10	RECENT ALLUVIAL DEPOSITS	SEDIMENTS DEPOSITED BY FLOOD WATER.	FLOOD PLAINS SUBJECT TO OVERFLOW.	ALONG WATER-COURSE.	CLAY TO COBBLES, THE TEXTURE OF THESE SOILS VARY BOTH HORIZONTALLY AND VERTICALLY AND REFLECT THE CHARACTERISTICS OF THE PARENT MATERIAL. COARSER MATERIAL USUALLY NEAREST CHANNEL AND BECOMING FINER TOWARDS EXTREMITIES.	VARIABLE.	USUALLY UNDERLAIN BY ADJACENT DEPOSITS. MAY BE PLASTIC. HIGH WATER TABLE.
13	ORGANIC DEPOSITS	ACCUMULATION OF ORGANIC AND INORGANIC MATERIAL IN BODY OF WATER.	DEPRESSIONS.	ALONG WATER-COURSES. HEADWATER OF UPLAND STREAMS, VALLEY FLOOR DEPRESSIONS.	CLAY TO FINE SAND AND ORGANIC MATTER, UNSORTED. IRREGULAR STRATIFICATION.	VARIABLE, HIGH WATER TABLE.	PLASTICITY VARIES. DEPTH TO MINERAL SOIL VARIES, BUT MAY EXTEND TO SOME DEPTH.
15	BEDROCK	THE MODE OF ORIGIN AND TYPE OF BEDROCK VARY CONSIDERABLY WITHIN THE REGION. PROJECTS WILL REQUIRE INDIVIDUAL INVESTIGATION.	UNDERLIES AND CONTROLS THE SURFACE OF LARGE FEATURES.	STEEPER PORTIONS OF VALLEY SLOPES, INCISED DRAINAGEWAYS, STEEP CLIFFS, LARGE FLAT AREAS.		VARIABLE. DEPENDS ON ROCK TYPE, JOINTS, FRACTURES, ETC.	MAY BE MAPPED IN COMBINATION WITH THIN TILL.
17	MAN-MADE FEATURES		EXCAVATED, FILLED OVER OR OTHERWISE MODIFIED.	USUALLY OCCURS ADJACENT TO THE CANALS, AS TOW PATH EMBANKMENTS, SPOIL BANKS, BORROW PITS, AND INDUSTRY.			PROBABLY SIMILAR TO SOILS OF THE ADJACENT MAJOR TERRAIN UNITS.
7PD, 10PD	POORLY DRAINED VARIANT			THESE ARE POORLY DRAINED PHASES OF THE ABOVE TERRAIN UNITS. THEY ARE SIMILAR IN CHARACTER TO THE DESCRIBED UNIT EXCEPT THAT THE SOIL REMAINS WET FOR A LARGE PART OF THE TIME. THESE SOILS ARE USUALLY WATER LOGGED DURING THE LATE FALL, WINTER AND EARLY SPRING. THE WATER TABLE REMAINS NEAR THE SURFACE EXCEPT DURING THE USUALLY WARM, DRY MONTHS.		

GENERAL EARTH ENGINEERING CONSIDERATIONS

MAP SYMBOL	TERRAIN UNIT	HIGHWAY LOCATION	CUTSLOPE CONDITIONS	SUBGRADE CONDITIONS	SOURCE OF MATERIALS
2	THIN TILL	NOT CRITICAL.	ROCK OR EARTH-ROCK COMBINATIONS.	ROCK MAY BE ENCOUNTERED. TRANSITION SECTIONS NECESSARY.	COMMON BORROW. LOW SOIL YIELD.
5	OUTWASH DEPOSITS	GENERALLY NOT CRITICAL. FOUNDATIONS FOR EMBANKMENTS OVER 25 FEET HIGH MAY BE UNSTABLE IF UNDERLAIN BY WEAKER DEPOSITS.	GENERALLY GOOD. POSITIVE DRAINAGE MAY BE REQUIRED TO PREVENT EROSION.	GENERALLY GOOD. MAY BE NON-UNIFORM.	COMMON BORROW AND GRANULAR MATERIALS.
6	LACUSTRINE SHORE DEPOSITS	FOUNDATIONS FOR EMBANKMENTS OVER 25 FEET HIGH PROBABLY UNSTABLE. CUTS WILL BE TROUBLESOME.	GENERALLY POOR. PROBLEMS OF EROSION OF FINE-GRAINED MATERIALS. MAY REQUIRE SLOPE PROTECTION OR FLATTENING FOR STABILITY.	SOFT, FINE-GRAINED MATERIAL. WET WITH DEPTH. POSSIBLE TRAFFICABILITY DIFFICULTIES. CONSIDER UNDERCUT.	COMMON BORROW. MAY BE OVER OPTIMUM MOISTURE CONTENT.
6/7	LACUSTRINE SHORE DEPOSITS OVER LACUSTRINE BOTTOM SEDIMENTS	SEE CHARACTERISTICS FOR EACH TERRAIN UNIT.			
7	LACUSTRINE BOTTOM SEDIMENTS	FOUNDATIONS FOR EMBANKMENTS 25 FEET HIGH PROBABLY UNSTABLE. CUTS WILL BE TROUBLESOME.	GENERALLY POOR. PROBLEMS OF FINE-GRAINED FLOWING MATERIALS. MAY REQUIRE SLOPE PROTECTION AND FLATTENING FOR STABILITY.	FINE-GRAINED MATERIALS MAY BE SOFT AND WET. TRAFFICABILITY DIFFICULTIES POSSIBLE. CONSIDER UNDERCUT.	COMMON BORROW. MAY BE OVER OPTIMUM MOISTURE CONTENT.
7PD	LACUSTRINE BOTTOM SEDIMENTS POORLY DRAINED	FOUNDATIONS FOR EMBANKMENTS 25 FEET HIGH PROBABLY UNSTABLE. CUTS WILL BE TROUBLESOME.	GENERALLY POOR. PROBLEMS OF FINE-GRAINED FLOWING MATERIALS. MAY REQUIRE SLOPE PROTECTION AND FLATTENING FOR STABILITY.	WET, SOFT, FINE-GRAINED MATERIALS. TRAFFICABILITY DIFFICULTIES, CONSIDER UNDERCUT.	COMMON BORROW. MAY BE OVER OPTIMUM MOISTURE CONTENT.

GENERAL EARTH ENGINEERING CONSIDERATIONS

MAP SYMBOL	TERRAIN UNIT	HIGHWAY LOCATION	CUTSLOPE CONDITIONS	SUBGRADE CONDITIONS	SOURCE OF MATERIALS
10	RECENT ALLUVIAL DEPOSITS	ABOVE EXPECTED HIGH WATER ELEVATION. FOUNDATIONS FOR EMBANKMENTS OVER 25 FEET HIGH MAY BE UNSTABLE. CUTS NOT ADVISABLE.	WATER PROBLEMS.	NON-UNIFORM. HIGHLY VARIABLE MATERIALS. MAY BE WET.	COMMON BORROW. MAY BE OVER OPTIMUM MOISTURE CONTENT.
10PD	RECENT ALLUVIAL DEPOSITS POORLY DRAINED	ABOVE EXPECTED HIGH WATER ELEVATION. FOUNDATIONS FOR EMBANKMENTS OVER 25 FEET HIGH MAY BE UNSTABLE. CUTS NOT ADVISABLE.	WATER PROBLEMS.	NON-UNIFORM. HIGHLY VARIABLE MATERIALS. MAY BE WET.	COMMON BORROW. MAY BE OVER OPTIMUM MOISTURE CONTENT.
13	ORGANIC DEPOSITS	ABOVE EXPECTED HIGH WATER ELEVATION. CUTS NOT ADVISABLE.	WATER PROBLEMS.	UNSUITABLE MATERIAL. MUST BE REMOVED AND REPLACED.	NOT SUITABLE.
17	MAN-MADE FEATURES	NO ENGINEERING INTERPRETATIONS ARE POSSIBLE WITHOUT SPECIFIC INFORMATION.			

APPENDIX B: GEOLOGIC REPORT and ROCK OUTCROP MAPPING

MEMORANDUM
DEPARTMENT OF TRANSPORTATION

TO: P. A. Walton, Associate Soils Engineer

FROM: P. Duskin, Assistant Engineering Geologist Priscilla Duskin

SUBJECT: GLENS FALLS FEEDER CANAL
PIN 1940.76
WARREN COUNTY

DATE: November 17, 1987

A request has been made of the Geologic Survey Section for an outcrop map and geologic report for the Finch Pruyn paper mill adjacent to the canal in Glens Falls. On October 14 and 15, this writer prepared the requested map. On October 21, accompanied by A.B. Klussendorf, Senior Engineering Geologist, an inspection of limestone on the plant property was made in order to find zones of water filtration within the bedrock.

The rock on the project site consists of limestone and dolomite. A stratigraphic column, written for the Jointa Lime Co. on the other side of the canal, was prepared by George L. Marshall (Consulting Geologist) in 1974 and is included in this report. The formations encountered consist of, from top to bottom, the Upper Member of the Glens Falls Formation, a thin-bedded limestone about 20 feet thick; the Larrabee Member of the Glens Falls Formation, a massive limestone with several feet of thin-bedded shaly limestone at the base; the Amsterdam Formation, a thin-bedded limestone with black shale partings; and the Fort Ann Formation, a buff-colored dolomite interbedded with limestone layers. The elevation of the top of the Larrabee Member is at about 260 feet, the top of the Amsterdam Formation is between 240 and 245 feet, and the top of the dolomitic Fort Ann Formation is at about 225 feet (see Attachment).

The rock strata are dipping to the south and southwest at 4 to 5 degrees, so that the normal flow of water along bedding planes would be from the canal into the Finch Pruyn property. No appreciable amount of water was seeping from the canal into the adjoining quarry to the north. An examination of the quarry walls which are not adjacent to the canal showed that groundwater seeps out at the base of the Amsterdam Formation, where thin-bedded shaly limestone overlies a more massive, watertight dolomite. The dolomite behaves as a barrier for the water.

The limestone within the Finch Pruyn site has two sets of vertical joints, one oriented generally north 84° east and the other north-south. Water is flowing through these interlocking joints and along the bedding planes of some of the thin-bedded shaly limestone. Groundwater is flowing audibly through solution-enlarged joints near the easternmost cylindrical tank (see Plans). This is causing the overlying rock to collapse, because the thin-bedded limestone below it is being sapped out by groundwater.

A large amount of water is flowing through rock at the cliff adjacent to the Hudson River. Many gallons per minute are coming through bedding planes at the bottom of the Amsterdam Formation, giving the appearance of a small waterfall over the cliff. Some gypsum is being precipitated from the water onto the surface of the limestone.

It is not known at this time where the water is leaving the canal and entering the surrounding rock. Once the water invades the rock, it flows downward along the vertical joint planes and then laterally along the southerly dipping bedding planes. The thin, shaly beds provide much less resistance to the flow of groundwater than the thicker, more massive beds. As a result, the flow is concentrated within the thin beds, eroding and sapping them out over time. The massive beds overlying the thin beds are then undercut. When the undercutting extends to where it intersects the vertical joint planes, the massive rock collapses. This is occurring at the "waterfall" by the Hudson River, and also behind the cylindrical tank.

PD:NLW
Attachment:

GEORGE L. MARSHALL
GEOLOGIST
AVERILL PARK, N. Y.

No.

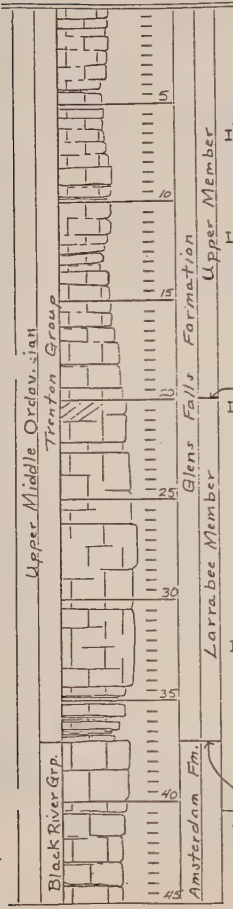
Company: Jointa Lime Company Date: 10/23/72

Project: 1973 Proposed Operations & Geology Report

Location: Glens Falls, New York

Drilled by: Logged by: GLM

DESCRIPTION THICKNESS



GENERAL STRATIGRAPHIC DESCRIPTION
OF ALL QUARRY FACES

INACTIVE FACES*

GLENS FALLS FORMATION (Approx. 37')

UPPER MEMBER

Limestone: medium dark gray to dark gray, generally weathers medium gray; generally fine grained and somewhat argillaceous to finely crystalline; generally in thin even, regular beds commonly separated by thin black shale partings, beds average about 6" thick. Approx. 20'

Contact ≈ 260' A.S.L.

LARRABEE MEMBER

Limestone: generally medium dark gray, weathers light to medium light gray; generally coarsely crystalline; very hard and dense, angular fracture; massive appearance with a medium to thick sub-bedding; locally cross bedded at top. Contains a few feet of thin beds separated by thin layers of light tannish gray, sublithographic, subconcoidally fracturing, laminated limestones at its base. (Isle La Motte Limestone?) Approx. 17'

AMSTERDAM FORMATION

Limestone: medium dark gray to dark gray, weathers medium to light medium gray; varies from fine grained, fine to medium crystalline, to beds of sublithographic stone near base; generally thin to medium bedded with black shale partings; bottom 6'± is thin to very thin bedded with prominent black shale partings. Approx. 23'

Contact 240'-245' A.S.L. Erosional unconformity

*Study area was south central wall of quarry where the beds are accessible.

GEOLOGIST
AVERILL PARK, N. Y.

No.

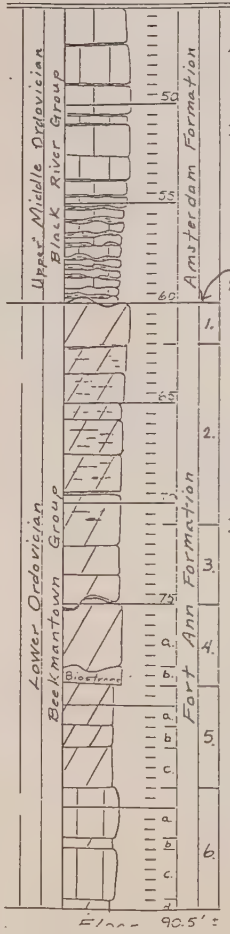
Company: Jointa Lime Company Date:

Project:

Location:

Drilled by: Logged by:

DESCRIPTION THICKNESS



ACTIVE FACES

FORT ANN FORMATION (± 30.5')

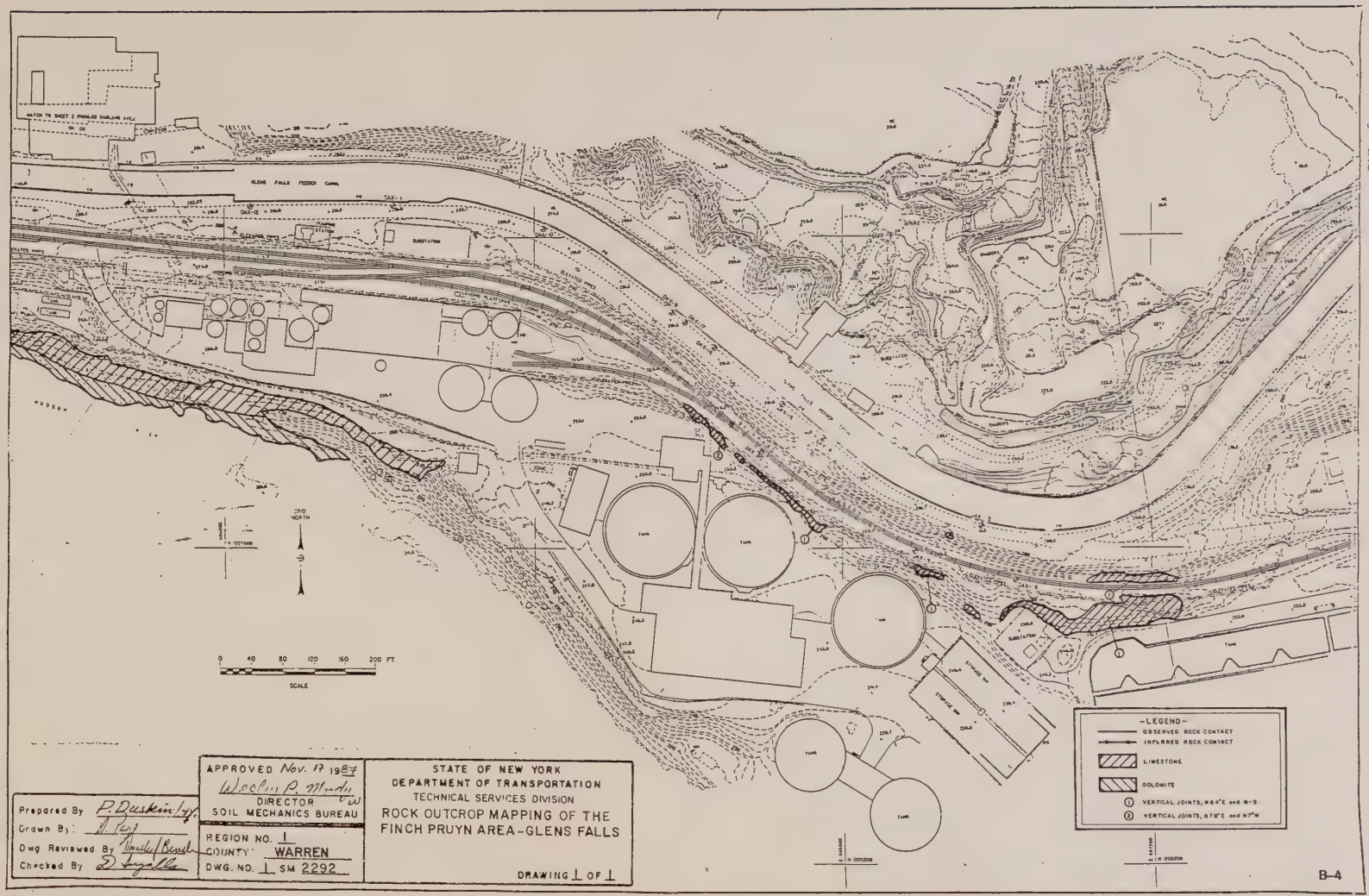
1. Dolomite: medium to medium dark gray, weathers light gray with a yellowish-greenish cast; fine to very finely crystalline; very silty; subconchoidal fracture; very hard and dense; generally as one massive bed; cut out in most parts of the quarry except the central part of the south wall. 2.1'

contact ≈ 225' A.S.L.

2. Dolomite: generally medium gray, with streaks and patches of dark gray to black, weathers buff with a greenish cast; generally fine to very finely crystalline; slightly petroliferous; slightly calcareous at base; very sharp to subconchoidal fracture; very hard and dense; very silty, has a harsh feel; massive to thick bedded, beds average 2 to 3' thick. Contains a 1" thick, prominent, black, pyritic shale parting about 1½' above the general base of the unit, weathers dark orange. 8.9'

3. Dolomite: dark medium gray, weathers medium to light grey to buff with a greenish cast; fine grained to finely crystalline; commonly slightly calcareous; locally petroliferous; very silty to sandy, has harsh feel; subconchoidal fracture; very hard and dense; calcite inclusions locally common; generally medium bedded with beds averaging 1 to 2', locally massive. Prominent, undulating, 0 - 3" thick, medium gray, dark orange weathering, laminated, pyritic, sublithographic dolomite layer marks the base of the unit; crest-trough amplitudes are as much as 1' in some areas. Avg. approx. 4'

4. Massive dolomite with basal biostrome:
   a. Dolomite: dark medium gray, weathers light gray to buff with a greenish cast; fine to very finely crystalline; very silty; somewhat calcareous at base B-3



Prepared By P. Duskin/ry
Drawn By: [illegible]
Dwg Reviewed By [illegible]
Checked By D. [illegible]

APPROVED Nov. 17 1987
Weslin P. Mrady
DIRECTOR
SOIL MECHANICS BUREAU

REGION NO. 1
COUNTY: WARREN
DWG. NO. 1 SM 2292

STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION
TECHNICAL SERVICES DIVISION
ROCK OUTCROP MAPPING OF THE
FINCH PRUYN AREA-GLENS FALLS

DRAWING 1 OF 1

APPENDIX C: GEOPHYSICAL SURVEY

January 18, 1988
WGC - 15932-03

New York Department of Transportation
Soil Mechanics Bureau
1220 Washington Avenue
Building 7
Albany, NY 12232

Attention: Mr. Phillip A. Walton

Gentlemen:

In accordance with your contract, Job No. 8723, a geophysical investigation was conducted at the Feeder Canal Project in Glens Falls, New York.

This report presents the results and findings of our investigation.

Sincerely,

WESTON GEOPHYSICAL CORPORATION

Ed Rostosky

ER:cap-1641J

Enclosure

GEOPHYSICAL MEASUREMENTS
FEEDER CANAL PROJECT
GLENS FALLS, NEW YORK

Prepared for
NEW YORK DEPARTMENT OF TRANSPORTATION

JANUARY 1988

Weston Geophysical
CORPORATION

Lyons Street • Post Office Box 550 • Westboro, Massachusetts 01581
Tel. (617) 366-9191 • FAX (617) 366-9197 • Telex No. 920491

1.0 INTRODUCTION & PURPOSE

Geophysical measurements were conducted for the New York Department of Transportation at the Feeder Canal Rehabilitation Site in Glens Falls, New York. The field work was conducted during the period of November 30 through December 4, 1987.

The purpose of this investigation was to determine the probable flow paths and depth of leakage from the feeder canal under the existing railroad tracks.

2.0 LOCATION AND SURVEY CONTROL

The general location of the site is shown on the Area of Investigation Map (Figure 1). This map is a segment of the Glens Falls, New York United States Geologic Survey Topographic Quadrangle Map.

The specific area and lines of coverage are shown on Figure 2. Line locations and stationing were based on existing stations along the south side of the canal.

3.0 METHODS OF INVESTIGATION

3.1 Acoustic Emission Monitoring (AEM)

The AEM system utilized for this project was developed by Weston Geophysical. This system has a digital display and permanent dual trace strip chart record of both total counts and counts per minute. For this project the total counts were recorded as well as direct earphone monitoring. Monitoring was conducted at 5 foot intervals along the southerly wall and 10 feet from the wall from Station 8+00 to approximately 23+00.

3.2 Electrical Resistivity

Electrical resistivity and electrolyte tracing measurements were made with a Bison Model 2350 earth resistivity meter and the Wenner electrode configuration. Electrode arrays were placed along and south of the railroad tracks (refer to Figure 2). Electrodes were spaced at 20 foot intervals along both arrays and background measurements were obtained at 20 and 60 foot electrode "A" spacings. Once background resistivity values were established for both electrode "A" spacings, an electrolyte (salt) was placed in the canal at suspected leakage areas (areas of high acoustic emissions detected with the AEM). Electrical resistivity measurements were then acquired at timed intervals until the conductive solution was detected (lower resistivity values than background).

4.0 DISCUSSION OF RESULTS

The results of this survey are presented on the plan map with detected anomalies (Figure 2) and electrical resistivity profiles (Figure 3). The areas of high acoustic emissions, detected electrolyte locations and probable flow paths are shown on Figure 2.

The AEM survey was conducted at random locations to determine optimum instrument settings (frequency, gain and trigger level) to compensate for background noise. For this survey, the total counts were recorded as well as direct earphone monitoring. The sensor was dragged along the bottom of the canal and stopped at 5 foot intervals for monitoring. After an initial "quiet down" period, acoustic emissions were monitored for approximately 30 to 40 seconds and recorded. The areas selected as suspected leakage zones are areas where the acoustic emission total counts exceeded 100 and direct earphone monitoring indicated flowing water. These areas were used as electrolyte injection areas.

The electrical resistivity measurements for electrolyte tracing was conducted in three phases: Stations 0+00 to 5+00 Line A "RR"; Stations

6+00 to 11+00 Line A "RR" and Stations 0+00 to 3+00 Line B. Although salt was placed in the canal at seven different locations, a probable flow path, based on electrolyte tracing results, was determined at three locations. An additional alignment based on the dye test only is shown on Figure 2. The dye was injected in the canal at approximately Station 14+0 and observed in the sink holes in the vicinity of Station 4+50 Line A "RR". The electrical resistivity did not detect the presence of electrolyte solution along this probable flow path, consequently, it is believed the flow path is deeper than the depth detectable with the 20 foot resistivity electrode "A" spacing. The basis for this alignment was determined by the high acoustic emissions at Station 13+50 in the canal and the approximate location of the sinkholes.

In most cases, the electrolyte was detected by the resistivity measurements within 15 to 30 minutes after insertion of the salt in the canal. The locations and times of detection are shown on the resistivity profiles (Figure 3).

Lower resistivity values were observed along Line B at the 20 foot electrode A spacings approximately 15 to 30 minutes after insertion of the electrolyte. It should be noted that these readings may have been affected by the higher moisture content in the near surface material at the time of the second and third readings. A wet snow, which caused surface puddles, likely attributed to the 40 to 60 ohm/ft. decrease in resistivity. Further investigation is warranted in the area of Station 2+30, Line B to either confirm or disprove that possible flow path.

5.0 RECOMMENDATIONS

It is recommended that ground penetrating radar (GPR) and seismic refraction be conducted along and below the railroad tracks to better define the fractured and voided bedrock. For the GPR investigation both a 300 and 120 MHz antenna should be utilized. The 300 MHz will most likely have better resolution but less penetration than the 120 MHz. Additionally, seismic refraction is a useful technique to determine areas of low velocity bedrock indicative of fractures and/or voiding.

GENERAL CONSIDERATONS

Acoustic emissions are impulsive subaudible sound waves caused by the release of stored elastic strain energy in stressed materials. These sounds may be generated by instabilities in dams and slopes, behind retaining walls, beneath footings, and in underground openings, mines, and quarries. Although normally small in amplitude, these sounds can be monitored by sensitive detectors which convert the emission energy into electrical signals. When suitably amplified, filtered, and quantified, the emissions are used to give an indication of stress conditions and stability in the material being monitored.

APPLICATION TO GEOLOGIC MATERIALS

In geologic materials, acoustic emissions may originate as continuous noise or as bursts of noise. Acoustic emissions can be the result of dislocations; grain boundary movement, or initiation and propagation of fractures through and between mineral grains. Each deformation and fracture process in geologic materials involves a transient phenomenon that is a known generator of acoustic emission activity. The sudden energy release generates an elastic stress wave yielding noise or acoustic emissions. During the application of stress to soil and rock, audible noise occurs near failure. It is important to monitor the subaudible sounds which are emitted from the soil or rock at lower stress levels.

In a soil mass, acoustic emissions are the internally generated sounds that result from certain stress conditions. The frictional components of soil are more emissive than the cohesive. Sliding friction, rolling friction, and degradation (particle crushing) generate acoustic emissions which typically occur in the frequency range of 500 Hz to 5,000 Hz for both granular and fine-grained soils. Attenuation of acoustic emission in soil is high, ranging from 1 dB/ft to 200 dB/ft and generally increasing with frequency. Since higher confining pressures generate higher frequencies, the signals from acoustic emissions generated in soils will travel only short distances within the soil mass. Accordingly, the pickup transducer must be near the emission source.

DETECTION OF ACOUSTIC EMISSIONS

Acoustic emissions are detected by a transducer placed on a wave guide or lowered to the desired level in a borehole. The acoustic emissions are then converted by the transducer into an electrical pulse which is amplified and filtered. All frequencies outside of the 500 Hz to 5,000 Hz range are generally considered to be extraneous noises caused by wind, operation of nearby equipment, airplanes, etc. Emissions are counted electronically, and the counts are recorded on a strip-type recorder. The slope of the line appearing on the chart represents the number of counts per unit time. Regarding the significance of acoustic emission rates above a background rate, Koerner, Lord, and McCabe (1978) report the following:

0 - 10	Counts/Minute - Condition Stable
10 - 100	Counts/Minute - Moderately Stable
10 - 500	Counts/Minute - Unstable Conditions
500+	Counts/Minute - State of Failure

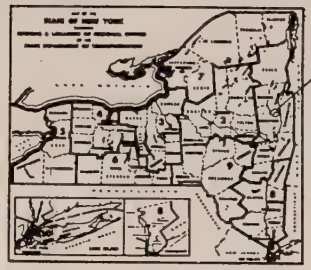
As more field data become available, more detailed quantitative assessments of acoustic emissions can be made.

Acoustic emissions are generally produced at a low amplitude. For that particular amplitude and time, the frequencies are variable. Most workers focus their attention on the 500 Hz to 5,000 Hz band, but it should be recognized that frequencies within a band of less than 500 Hz or as high as several megahertz can be produced. The area to be tested should undergo a preliminary geologic assessment. A determination of background noise for the entire site should be made prior to monitoring acoustic emissions.

APPENDIX D: CONTRACTS

D96869

D96869



WORK SITE

REVISIONS

	STATE		SHEET NO.	TOTAL SHEETS
1	N.Y.		1A1	5
REPAIRS TO PORTIONS OF GLENS FALLS FEEDER AT GLENS FALLS, WARREN COUNTY				

STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION
OFFICE OF OPERATIONS
WATERWAYS MAINTENANCE DIVISION

CHAPTER 542, LAWS OF 1938

TYPE OF CONSTRUCTION

Remove existing floor from certain portions of the feeder channel. Build new reinforced concrete walls within the space between the existing walls and to the same top dimension. Build new reinforced concrete floor to the same dimension as the existing floor.

All work contemplated under this contract is to be carried out and in conformity with the specifications of January 2, 1981, except as modified on these plans and in the Itemized Proposal.

STANDARD SHEETS: 203-5R1, 502-1R1, 502-2R1

CONTRACT D96869
(CANAL REFERENCE NO. M 81-3)
FOR
REPAIRS TO PORTIONS OF GLENS FALLS FEEDER
CITY OF GLENS FALLS
WARREN COUNTY
SHEETS 1 THROUGH 5 INCLUSIVE
SCALES AS INDICATED

RECORD PLANS

WORK SITES

LOCATION MAP - WARREN COUNTY - SCALE: 1 inch = 800 feet

INDEX TO PLAN SHEETS	
SHEET NO.	SHEET TITLE
1	TITLE SHEET
2	TOPOGRAPHY, GENERAL NOTES AND QUANTITY EST.
3	WORK SITE AND APPROACHES
4	TROUGH LOCATION AND JOINT DETAILS
5	TROUGH DETAILS AND BAR LIST

CONTRACT NO. D96869
CONTRACTORS NAME Wm. T. Kruse & Sons
DATE OF CONTRACT
AWARD DATE 10/23/81
COMPLETION DATE 4/16/82
FINAL ACCEPTANCE 2nd/10/82
REGIONAL DIRECTOR C.E. Carlson
ENGINEER IN CHARGE Ted Collins
SIGNATURE Ted Collins
CONTRACT COST 727,938.73

REVISIONS

CAPITAL PROJECT IDENTIFICATION NO. 1940.48.301

RECOMMENDED BY: REGIONAL CONSTRUCTION ENGINEER — DATE 6/15/81

RECOMMENDED BY: REGIONAL WATERWAYS MAINT. ENGINEER — DATE 6/15/81

PREPARED PURSUANT TO THE CANAL LAW AND RECOMMENDED BY: REGIONAL DIRECTOR — DATE 6/16/81

APPROVED: JOSEPH R. STELLATO, DIRECTOR WATERWAYS MAINT. — 6/24/81

TITLE SHEET

STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION

DRAWING No.	SCALE	DATE	REGION ONE
1	As Noted	6-81	

D96869

D96869

D96869

FED ROAD REG NO	STATE	FEDERAL AID PROJECT NO	SHEET NO	TOTAL SHEETS
1	N Y		5	5

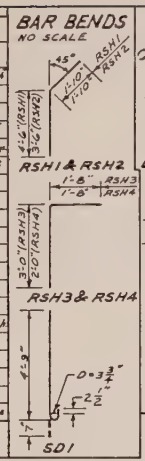
REPAIRS TO PORTIONS OF GLENS FALLS FEEDER AT GLENS FALLS, WARREN COUNTY

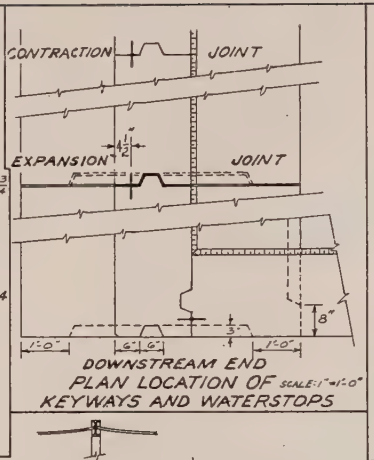
BAR LIST

Mark	No. Reqd.	Length Ft.-In.	Remarks
FH1	320	48 6	For flgs. @ 36'-0", 95'-6", 95'-6", 35'-0" & 49'-6"
FH2	32	41 0	For footings @ 80'-10" & 79'-10"
FH3	32	39 6	For footings @ 78'-3"
FH4	64	32 6	For flgs. @ 48'-0", 63'-0" & 62'-0"
FH5	3,326	5 4	For all footings except return flgs.
SH1	898	31 4	For stems @ 32'-0, 31'-8, 32A & 32B
SH2	90	31 0	For stems @ 31'-6", 31'-4" & 32A
SH3	76	30 4	For stems @ 31'-0" & 32B
SH4	28	16 4	For stems @ 16'-10"
SH5	28	13 9	For stems @ 14'-3"
SV1	3,336	8 6	For all stems.
SD1	1,664	5 4	For all stems. See sketch.
RFH1	20	3 4	
RFH2	24	3 6	Cut in field if necessary.
RSH1	36	6 4	For upstream return stems See sketch
RSH2	36	5 4	" " and return footings " "
RSH3	36	6 8	" downstream ret. stems " "
RSH4	20	3 8	" " " " " "
RSH5	56	6 0	Cut in field if necessary.
RSD1	48*	2 0	*Includes 16 bars @ upstream ret. flgs.

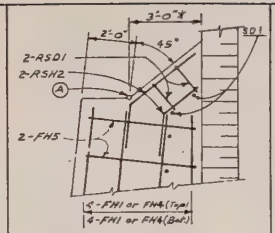
All bars are size #5.
See Sheet 4 for locations of stems A and B.

BAR BENDS
NO SCALE

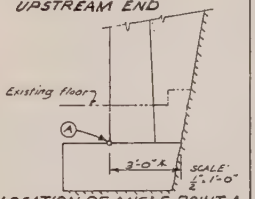




DOWNSTREAM END
PLAN LOCATION OF KEYWAYS AND WATERSTOPS
SCALE: 1"=1'-0"

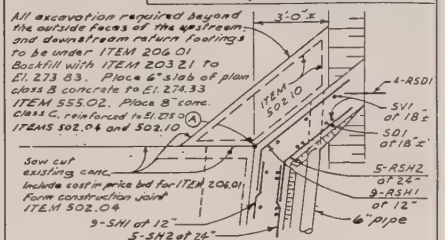


FOOTING PLAN AT UPSTREAM END

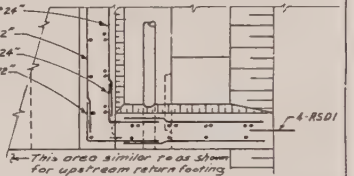


LOCATION OF ANGLE POINT A

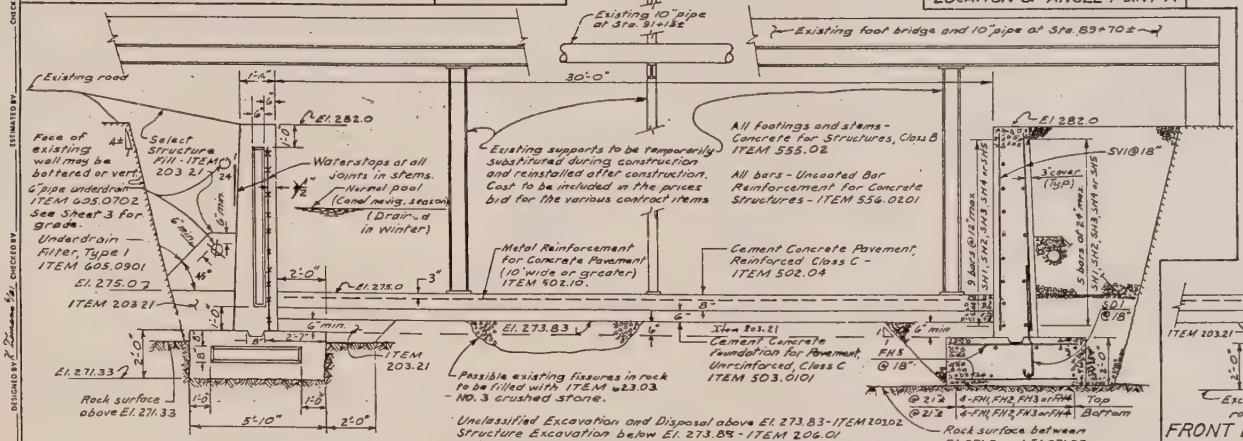
REVISIONS



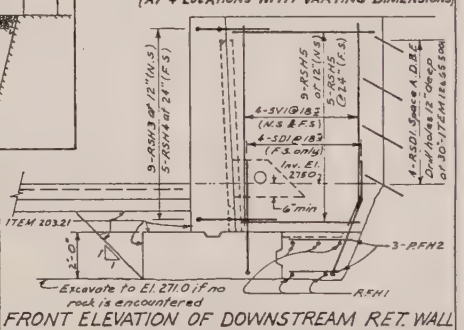
PLAN OF UPSTREAM RETURN WALL
(AT 4 LOCATIONS)



PLAN OF DOWNSTREAM RETURN WALL
(AT 4 LOCATIONS WITH VARYING DIMENSIONS)



CROSS SECTION OF TROUGH
(TYPICAL EXCEPT FOR TWO CROSSINGS SHOWN)
SCALE: ½"=1'-0"



FRONT ELEVATION OF DOWNSTREAM RET. WALL
SCALE: ½"=1'-0"

REVISIONS

TROUGH DETAILS & BAR LIST

STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION

DRAWING No.	SCALE	DATE	REGION

DESIGNED BY — DRAFTED BY — CHECKED BY — ESTIMATED BY — CHECKED BY — DATE

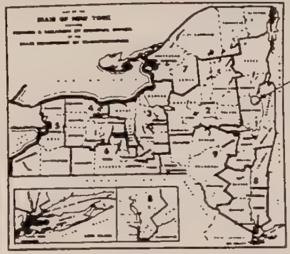
M 47-2 (5/78)
INCHAGE OF

D-3

D251204

STATE		SHEET NO.	TOTAL SHEETS
1	N.Y.	1	8

REPAIR OF A PORTION OF GLENS FALLS FEEDER, TOWN OF QUEENSBURY, WARREN CO



STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION
OFFICE OF OPERATIONS
WATERWAYS MAINTENANCE DIVISION

CHAPTER 547 LAWS OF 1936

CONTRACT D251204
REPAIR OF A PORTION OF GLENS FALLS FEEDER
TOWN OF QUEENSBURY

WARREN COUNTY

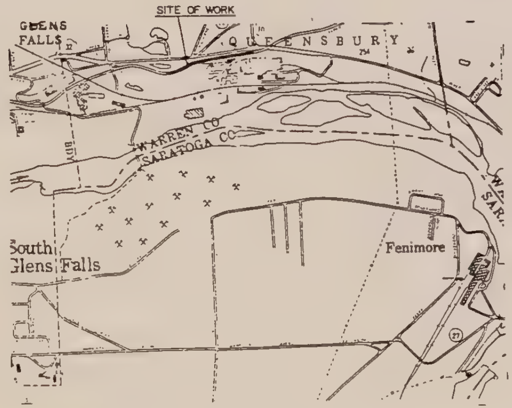
CANAL REFERENCE NO. M84-11
SHEETS 1 THRU 8
SCALES AS INDICATED

RECORD PLANS

TYPE OF CONSTRUCTION:

Remove a three foot wide strip of floor along the south face of the concrete feeder trough. Drive a single row of permanent steel sheet piling cutoff wall in front of the existing south wall and place concrete between the new and old walls.
Excavate berm and build a new tied back wall at one location where existing wall has collapsed.
At the location of an existing waste weir, build a new concrete wall and install a new 3ft. x 3ft. slide gate.

All work contemplated under this contract is to be governed by and in conformity with the specifications of January 2, 1981, as amended by Addendum No. 1 except as modified on these plans and in the Itemized Proposal.



LOCATION MAP, WARREN CO.

INDEX	
SHEET NO.	TITLE
1	TITLE SHEET
2	QUANTITIES & GENERAL NOTES
3	WORK SITE & APPROACHES
4	LOCATION PLAN
5	TYPICAL DETAILS
6	NEW 3'x 3' WASTE GATE
7	TIED BACK WALL AND BAR LIST
8	BORING LOCATION PLAN AND GENERAL SUBSURFACE PROFILE

TABLE OF QUANTITIES

ITEM	DESCRIPTION	UNIT	E.T. QUANT	FINAL QUANT
201.0601	Clearing and Grubbing	LS	100	100
203.02	Unclassified Excav. and Disposal	C.Y.		333.7[illegible]
[illegible]	Select Struct. [illegible] Fill	C.Y.	25	[illegible]
206.01	Structure Excavation	C.Y.	200	[illegible]
[illegible] 304.01.7	Subbase Course	[illegible]		320.29
[illegible] 502.04	Cement Concrete Pavement [illegible]	[illegible]		[illegible]
502.10	Mesh Reinf. for Conc. Pavt.	[illegible]		[illegible]
[illegible]	[illegible] Pavt. and Shoulder [illegible]	[illegible]		[illegible]
18 502.472002	Resealing Transverse Joints	LF		68.30
18 502.4425	Resealing Longitudinal Joints	LF		203.[illegible]
15 502.5502	Saw Cutting Conc. Pavt.	[illegible]		[illegible]
552.02	Permanent Steel Sheet Piling	SF	[illegible]	[illegible]
555.01	Conc. for Structures Class "A"	[illegible]	[illegible]	[illegible]
[illegible]	Conc. for Structures Class "[illegible]"	[illegible]		[illegible]
[illegible]	Steel [illegible] Reinf. for Structures	[illegible]	[illegible]	[illegible]
[illegible]	Uncoated Bar Reinf. for [illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible] Bar Reinf. for [illegible]	[illegible]		[illegible]
[illegible]	Structural [illegible]	[illegible]	[illegible]	[illegible]
586.0	[illegible]	[illegible]		[illegible]
619.[illegible]	Basic Maint. and Prot. of Traffic	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	EA	[illegible]	[illegible]
[illegible]	Crushed Stone	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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[illegible]	[illegible]	[illegible]		[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

REVISION IN TABLES

CONTRACT NO. D 251204
CONTRACTORS NAME Schultz Const.
DATE OF CONTRACT Oct. 22 1984
AWARD DATE Nov. 2, 1984
COMPLETION DATE May 31, 1985
FINAL ACCEPTANCE Aug. 16, 1985
REGIONAL DIRECTOR D.A. [illegible]
ENGINEER IN CHARGE [illegible]
SIGNATURE [illegible]
CONTRACT COST $675,0[illegible].42

RECOMMENDED: [signature] 8/7/84
REGIONAL CONSTRUCTION ENGINEER DATE

RECOMMENDED:
REGIONAL WATERWAYS MAINT. ENGINEER DATE

APPROVED [signature] [illegible]
JOHN J. [illegible] DIRECTOR WATERWAYS MAINT.

CAPITAL PROJECT IDENTIFICATION NO 1940 54.301

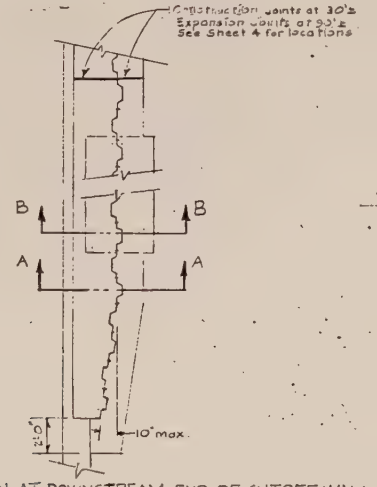
TITLE SHEET
STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION

D251204

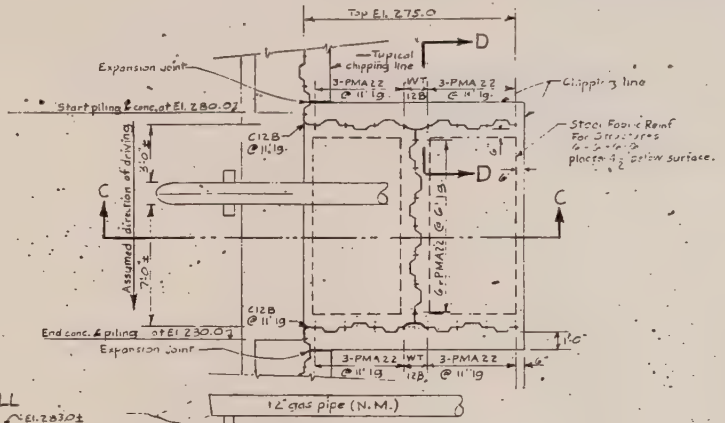
D231204

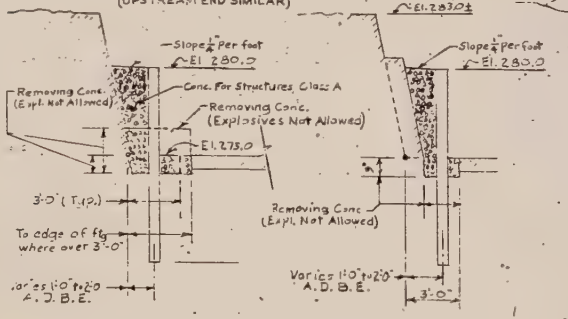
STATE		SHEET NO.	TOTAL SHEETS
N.Y.		5	8

REPAIR OF A PORTION OF GLENS FALLS FEEDER
TOWN OF QUEENSBURY, WARREN COUNTY



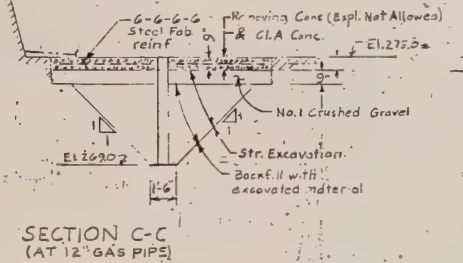
PLAN AT DOWNSTREAM END OF CUTOFF WALL
(UPSTREAM END SIMILAR)



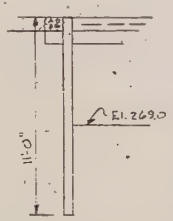


SECTION A-A.
(TYPICAL)

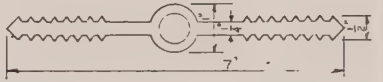
SECTION B-B
(AT PATCHES)



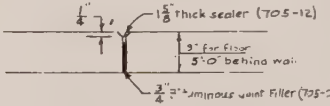
SECTION C-C
(AT 12" GAS PIPE)



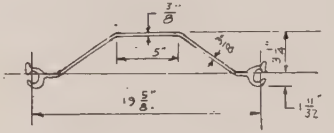
SECTION D-D
(AT 12" GAS PIPE)



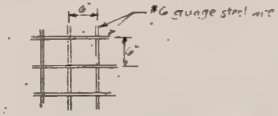
TYPE B - PVC WATERSTOP - 705-11
FULL SIZE



EXPANSION JOINT



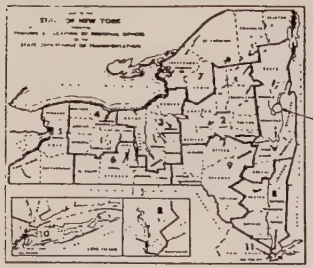
PMA 22



6-6-6-6 STEEL FABRIC

TYPICAL DETAILS

MADE BY K. Zimmer 1964



PROJECT LOCATION:

THIS PROJECT IS LOCATED AT FOUR SITES ALONG THE GLENS FALLS FEEDER CANAL IN THE CITY OF GLENS FALLS AND THE TOWN OF QUEENSBURY, WARREN COUNTY.

STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION
OFFICE OF ENGINEERING

NOTE
PHOTOGRAPHIC REPRODUCTIONS
These plans are not to scale.
All scales are reduced from indicated to approximately half size.

ALL WORK CONTEMPLATED UNDER THIS CONTRACT IS TO BE COVERED BY AND IN CONFORMITY WITH THE SPECIFICATIONS OF JANUARY 2, 1965, AS AMENDED BY ADDENDUM 1, EXCEPT AS MODIFIED ON THESE PLANS AND IN THE ITEMIZED PROPOSAL

GEOMEMBRANE LINER INSTALLATION AND RELATED WORK
GLENS FALLS FEEDER CANAL
IN GLENS FALLS AND THE TOWN OF QUEENSBURY

WARREN COUNTY

12 SHEETS

CONTRACT D252276

BUREAU OF SOIL MECHANICS GENERAL SOILS ENGINEERING	
REVIEWED BY	DATE
ECS	9/9/87

CONTRACTOR'S NAME
AWARD DATE
COMPLETION DATE
FINAL ACCEPTANCE DATE
REGIONAL DIRECTOR
Name
ENGINEER IN CHARGE
Name
FINAL COST TOTAL
FISCAL SHARE COST(S)

NEW YORK STATE DEPARTMENT OF TRANSPORTATION
Approved August 20, 1987
Acting in his capacity as
JOHN R. FERRAND Director, Waterways Maintenance Division

GLENS FALLS FEEDER CANAL - LEAK REPAIRS			
CITY OF GLENS FALLS, TOWN OF QUEENSBURY			
WARREN COUNTY			
FED ROAD REG NO	STATE	SHEET NO	TOTAL SHEETS
1	N.Y.	1	12
FEDERAL AID PROJECT NO			
CAPITAL PROJECT IDENTIFICATION NO	1940.79.301		

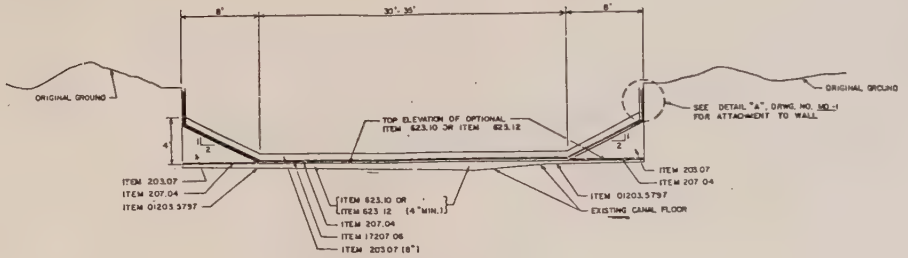
INDEX ON SHEET NO 2

[signature]	7/15/87	RECOMMENDED BY [signature]	7/15/87	RECOMMENDED BY [signature]	7/15/87	RECOMMENDED BY [signature]	7/15/87	APPROVED BY [signature]	7/15/87
ENGINEER	DATE	REGIONAL CONSTRUCTION ENGINEER	DATE	REGIONAL WATERWAYS MAINTENANCE ENGINEER	DATE	REGIONAL TRAFFIC ENGINEER	DATE	REGIONAL DIRECTOR	DATE

D252276

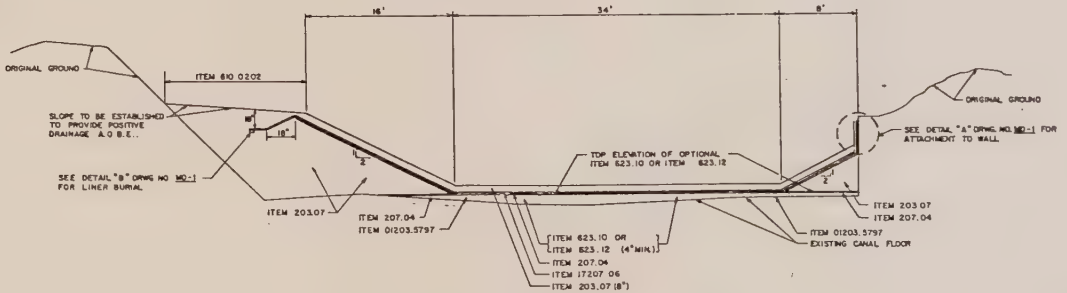
FED. ROAD INDS. NO.	STATE	FEDERAL AID PROJECT NO.	SHEET NO.	TO SH
1	N.Y.		3	12

GLENS FALL FEEDER CANAL
CITY OF GLENS FALLS, TOWN QUEENSBURY
WARREN COUNTY



TYPICAL SECTION – SITE # 1
GLENS FALLS FEEDER CANAL

STA. 10+00 TO 15+25
STA. 17+75 TO 18+50
NO SCALE



TYPICAL SECTION – SITE # 1
GLENS FALLS FEEDER CANAL

STA. 15+25 TO 17+75
NO SCALE

ITEM NO.	DESCRIPTION
203.07	SELECT GRANULAR FILL
01203.5797	CLEANING EXISTING CHANNELS AND CANAL FLOORS
207.04	GEOTEXTILE SLOPE PROTECTION
17207.06	GEOMEMBRANE
610.0202	SEEDING
623.10	SCREENED GRAVEL
623.12	CRUSHED STONE

ITEM NO.	DESCRIPTION

NOTES:

1.) THE MINIMUM ALLOWABLE THICKNESS OF ITEM 207.04 SHALL BE 100 MILS FOR ALL APPLICATIONS ON THIS CONTRACT.

2.) WHERE ITEM 207.04 IS USED TO SEPERATE OPTIONAL ITEM 623.10 OR ITEM 623.12 FROM ITEM 203.07 IT SHALL OVERLAP THE ITEM 207.04 AT THE TOE OF THE 1 OR 2 SLOPE BY A MINIMUM OF ONE FOOT.

3.) ANY HOLES OR CRACKS IN THE CANAL FLOOR LARGER THAN FOUR INCHES IN WIDTH SHALL BE FILLED WITH ITEM 203.07 – SELECT GRANULAR FILL TO A TOP ELEVATION SMOOTH WITH THE SURROUNDING FLOOR

AS – BUILT REVISIONS

SIGNATURE DATE

TYPICAL SECTIONS

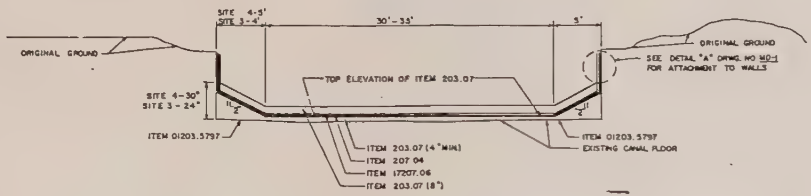
STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION

DRAWING NO.	SCALE	DATE	REGION ONE
TS-1	NONE		

D252276

FED. ROAD REG. NO.	STATE	FEDERAL AID PROJECT NO.	SHEET NO.	TOT. SHTS.
1	N.Y.		4	12

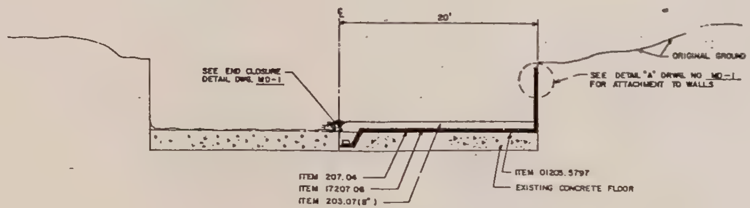
GLENS FALLS FEEDER CANAL
CITY OF GLENS FALLS, TOWN OF QUEENSBURY
WARREN COUNTY



TYPICAL SECTION - SITES # 3,&4
GLENS FALLS FEEDER CANAL

SITE # 3 - STA. 10+53 TO 12+72
SITE # 4 - STA. 10+00 TO 13+25

NO SCALE



TYPICAL SECTION - SITE # 5
GLENS FALLS FEEDER CANAL

STA. 10+00 TO 11+13
NO SCALE

ITEM NO.	DESCRIPTION	ITEM NO.	DESCRIPTION
203.07	SELECT GRANULAR FILL		
01203.5797	CLEANING EXISTING CHANNELS AND CANAL FLOORS		
207.04	GEOTEXTILE SLOPE PROTECTION		
17207.06	GEOMEMBRANE		

NOTES:

1.) THE MINIMUM ALLOWABLE THICKNESS OF ITEM 207.04 SHALL BE 100 MILS FOR ALL APPLICATIONS ON THIS CONTRACT.

2.) ANY HOLES OR CRACKS IN THE CANAL FLOOR LARGER THAN FOUR INCHES IN WIDTH SHALL BE FILLED WITH ITEM 203.07 - SELECT GRANULAR FILL TO A TOP ELEVATION SMOOTH WITH THE SURROUNDING FLOOR.

AS - BUILT REVISIONS

SIGNATURE | DATE

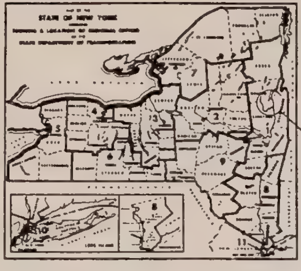
TYPICAL SECTIONS

STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION

DRAWING No.	SCALE	DATE	REGION ONE
TS-2	NONE		

CHANGE OF ... DESIGNED BY ... CHECKED BY ... ESTIMATED BY ... CHECKED BY ... DRAFTED BY ... CHECKED BY ... DATE

D252315



STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION
OFFICE OF OPERATIONS
WATERWAYS MAINTENANCE DIVISION

CHAPTER 542, LAWS OF 1939

STANDARD SHEET
203-5R1

ALL WORK CONTEMPLATED UNDER THIS CONTRACT IS TO BE COVERED BY AND IN CONFORMITY WITH THE SPECIFICATIONS OF JANUARY 2, 1985, AS AMENDED BY ADDENDUM 1, EXCEPT AS MODIFIED ON THESE PLANS AND IN THE ITEMIZED PROPOSAL.

GLENS FALLS FEEDER CANAL REHABILITATION

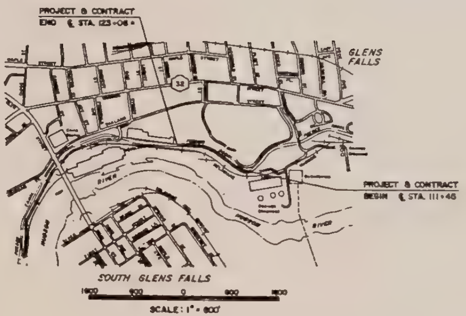
WARREN COUNTY

13 SHEETS

CONTRACT D252315

PROJECT DESCRIPTION:

THIS REHABILITATION OF THE GLENS FALLS FEEDER CANAL IS LOCATED ON THE PORTION OF THE FEEDER THAT TRAVERSES THE FINCH-PRUYN PAPER MILL PROPERTY. THE PROJECT BEGINS APPROXIMATELY 1,610 FEET EAST OF THE FEEDER CANAL BRIDGE OFF OAKLAND AVENUE AND EXTENDS WESTERLY TO A POINT 450 FEET EAST OF THIS BRIDGE.
ALL WORK IS WITHIN THE CITY OF GLENS FALLS, WARREN COUNTY.



CONTRACTOR'S NAME
AWARD DATE
COMPLETION DATE
FINAL ACCEPTANCE DATE
REGIONAL DIRECTOR
Name
ENGINEER IN CHARGE
Name
FINAL COST TOTAL
FISCAL SHARE COST(S)

RECOMMENDED BY [signature] 9/28/87
REGIONAL CONSTRUCTION ENGINEER DATE

RECOMMENDED BY [signature] 9/28/87
REGIONAL WATERWAYS MAINT. ENGINEER DATE

PURSUANT TO THE CANAL LAW AND RECOMMENDED BY [signature] 9/28/87
REGIONAL DIRECTOR DATE

APPROVED BY
JOHN R. JERMANO, DIRECTOR OF WATERWAYS MAINT. DATE

APPROVED BY
D.J. MACMILLAN, ACTING DEPUTY CHIEF ENGINEER, STRUCTURES DATE

INDEX ON SHEET NO. 2

GLENS FALLS FEEDER CANAL REPAIR AT GLENS FALLS			
WARREN COUNTY			
FED. ROAD REG. NO.	STATE	SHEET NO.	TOTAL SHEETS
1	N.Y.	1	13
FEDERAL AID PROJECT NO.			
CAPITAL PROJECT IDENTIFICATION NO.	1940 76 301		

IN CHARGE OF [signature] DESIGNED BY [signature] CHECKED BY [signature] ESTIMATED BY [signature] CHECKED BY [signature] DRAFTED BY [signature] CHECKED BY [signature] DATE 9-28-87

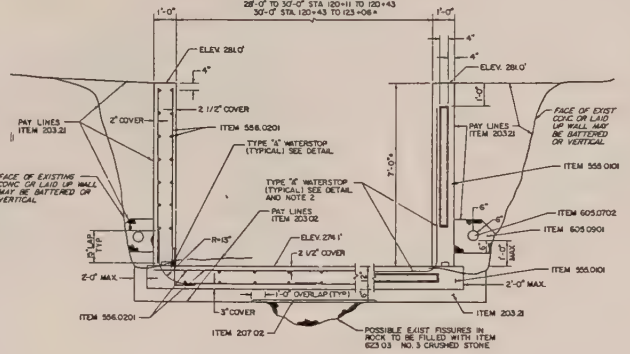
D252315

D252315

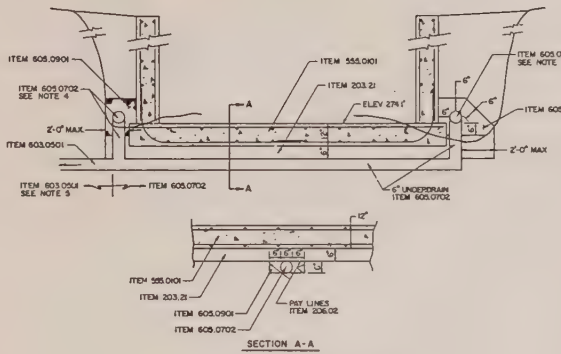
FED. ROAD REG. NO.	STATE	FEDERAL AID PROJECT NO	SHEET NO.	TOTAL SHEETS
1	N.Y.		9	13

GLENS FALLS FEEDER CANAL REPAIR AT GLENS FALLS
WARREN COUNTY

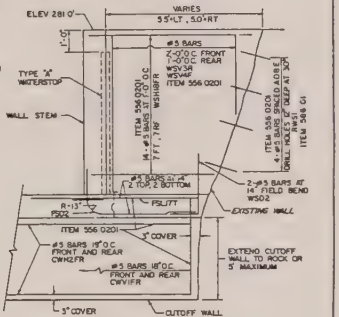
30'-0" STA 111+45 TO 115+36
30'-0" TO 28'-0" STA 115+36 TO 115+68
28'-0" STA 115+68 TO 120+11
28'-0" TO 30'-0" STA 120+11 TO 120+43
30'-0" STA 120+43 TO 123+06±



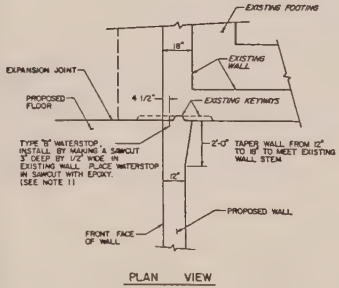
CROSS SECTION OF TROUGH



DETAIL OF UNDERDRAIN LATERALS
SEE NOTE 3

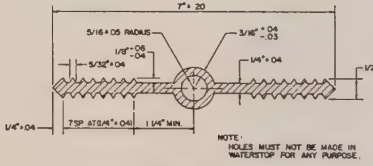


FRONT ELEVATION

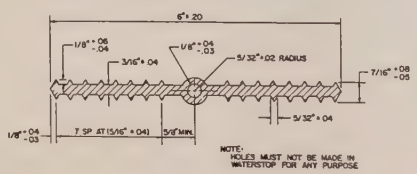


PLAN VIEW

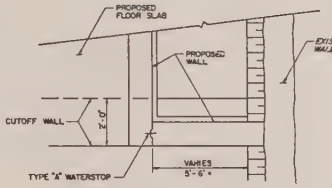
DETAIL OF PROPOSED TROUGH
STA. ℄ 123+06±



PVC WATERSTOP - TYPE "B"

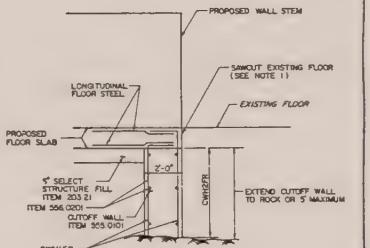


PVC WATERSTOP - TYPE "A"



PLAN VIEW

PLAN OF DOWNSTREAM RETURN WALL AND CUTOFF WALL



SIDE ELEVATION

AS-BUILT REVISIONS

SIGNATURE DATE

ITEM	DESCRIPTION	ITEM	DESCRIPTION
203.02	UNCLASSIFIED EXCAVATION AND DISPOSAL	623.03	CRUSHED STONE (BY WEIGHT)
203.21	SELECT STRUCTURE FILL	566.01	DRILLING & GROUTING BOLTS, OR REINFORCING BARS
206.02	TRENCH AND CULVERT EXCAVATION		
207.02	GEOTEXTILE UNDERCUT		
555.0101	CONCRETE FOR STRUCTURES, CLASS A (MASS PLACEMENTS)		
556.0201	UNCOATED BAR REINFORCEMENT FOR CONC. STRUCTURES		
603.0501	CORRUGATED STEEL PIPE (2 2/3 x 1/2), 6 DIA, 18 GA.		
605.0702	STEEL PIPE UNDERDRAIN, 6" DIA., 18 GA.		
605.0901	UNDERDRAIN FILTER, TYPE 2		

NOTES

1. SAWCUTTING EXISTING CONCRETE TO BE INCLUDED IN PRICE BID FOR ITEM 556.0101.
2. AT EXPANSION JOINTS USE TYPE "B" WATERSTOP.
3. TENTATIVE LOCATIONS FOR UNDERDRAIN LATERALS FOR OUTLETTING SHOWN ON PLAN (DWG. NO. GP-1). FIELD CONDITIONS MAY REQUIRE RELOCATION OF PROPOSED LATERALS FOR OUTLETTING AS BUILT.
4. FOR PROFILE OF PROPOSED UNDERDRAIN SEE DWG. NO. P-1
5. NO UNDERDRAIN FILTER WILL BE PLACED FROM EXISTING SOUTH WALL TO OUTLET OF PIPE. CRUSHED STONE (ITEM 623.03) SHALL BE PLACED AT OUTLET.
6. EXCAVATION & PLACEMENT OF OUTLET PIPES SHALL CONFORM TO STANDARD SHEET 203-5R1.

MISCELLANEOUS DETAILS

STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION

DRAWING NO.	SCALE	DATE	REGION
MD-1	NONE	9/87	1

D-10

DESIGNED BY D. Thompson CHECKED BY D. Castronovo ESTIMATED BY W.L. McCall CHECKED BY D. Castronovo DRAFTED BY Richard Hall CHECKED BY Anthony Ford DATE 8-27-87

IN CHARGE OF D. Thompson

NC 47-7 (5/76)

D252317

THE PROJECT AREA EXTENDS SOUTHEAST ALONG THE GLENS FALLS FEEDER CANAL, FROM THE INTERSECTION OF BURGOYNE AVENUE AND PINE STREET IN THE VILLAGE OF HUDSON FALLS TO A POINT APPROXIMATELY 460' EAST OF THE INTERSECTION. ALL WORK IS WITHIN THE VILLAGE OF HUDSON FALLS.

STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION
OFFICE OF OPERATIONS
WATERWAYS MAINTENANCE DIVISION

CHAPTER 542, LAWS OF 1939

TYPE OF CONSTRUCTION:

Retaining Wall and Earth Dam Repairs, Access Road Construction

STANDARD SHEET:

203-2R1

ALL WORK CONTEMPLATED UNDER THIS CONTRACT IS TO BE COVERED BY AND IN CONFORMITY WITH THE SPECIFICATIONS OF JANUARY 2, 1985, AS AMENDED BY ADDENDUM 1, EXCEPT AS MODIFIED ON THESE PLANS AND IN THE ITEMIZED PROPOSAL.

REHABILITATION OF GLENS FALLS FEEDER CANAL IN HUDSON FALLS

WASHINGTON COUNTY

8 SHEETS

CONTRACT D252317

CONTRACTOR'S NAME .....

AWARD DATE .....

COMPLETION DATE .....

FINAL ACCEPTANCE DATE .....

REGIONAL DIRECTOR .....
Name

ENGINEER IN CHARGE .....
Name

FINAL COST TOTAL .....

FISCAL SHARE COST(S)

REPAIRS TO A PORTION OF THE			
GLENS FALLS FEEDER CANAL-5 COMBINED LOCKS			
VILLAGE OF HUDSON FALLS			
WASHINGTON COUNTY			
	STATE	SHEET NO.	TOTAL SHEETS
1	N.Y.	1	8
PROJECT NO			
CAPITAL PROJECT IDENTIFICATION NO	1940.77.301		

INDEX ON SHEET NO 2

RECOMMENDED BY: [signature] 10/1/87 — REGIONAL CONSTRUCTION ENGINEER — DATE

RECOMMENDED BY: [signature] 10/1/87 — REGIONAL WATERWAYS MAINT. ENGINEER — DATE

PURSUANT TO THE CANAL LAW AND RECOMMENDED BY: [signature] 10/1/87 — REGIONAL DIRECTOR — DATE

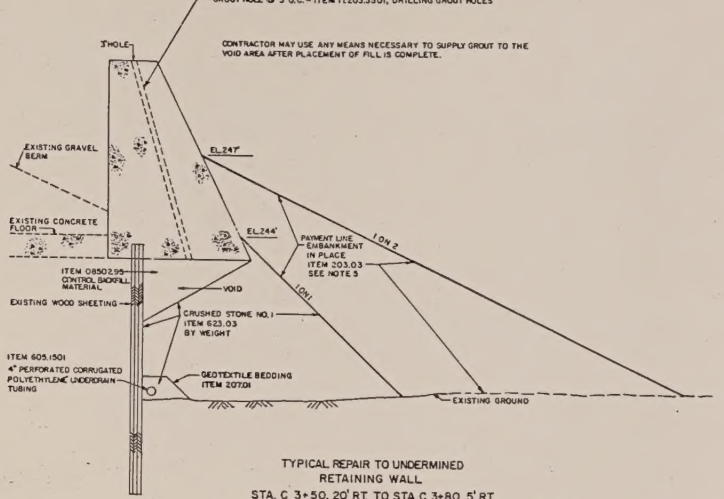
APPROVED BY: [signature] 10/1/87 — JOHN R. JORNANO, DIRECTOR OF WATERWAYS MAINT. — DATE

IN CHARGE: [signature] DESIGNED BY: [signature] CHECKED BY: [signature] ESTIMATED BY: [signature] CHECKED BY: [signature] DRAFTED BY: [signature] CHECKED BY: [signature] DATE: 10/87

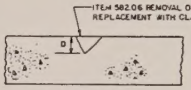
D252317

FED. ROAD REG. I.D.	STATE	FEDERAL AID PROJECT NO.	SHEET NO.	TOTAL SHEETS
1	N.Y.		7	8

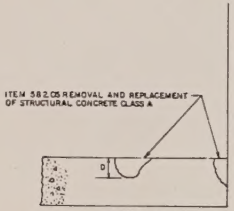
REPAIRS TO GLENS FALLS FEEDER CANAL
VILLAGE OF HUDSON FALLS
WASHINGTON COUNTY



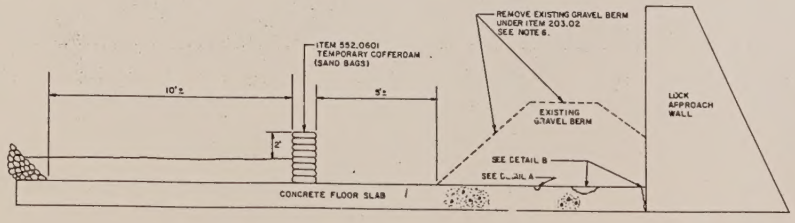
TYPICAL REPAIR TO UNDERMINED RETAINING WALL
STA. C 3+50, 20' RT. TO STA. C 3+80, 5' RT.
SCALE: 1" = 2'



DETAIL A
MINOR CONCRETE REPAIR
D = 5" OR LESS



DETAIL B
MAJOR CONCRETE REPAIR
D = GREATER THAN 5"



CONCRETE FLOOR REPAIR DETAIL
SCALE: 1" = 2'

NOTE:

1. CONTRACTOR WILL PLACE SANDBAGS TO CHANNEL FLOW AWAY FROM TEMPORARY GRAVEL BERM AND APPROACH WALL TO ALLOW FOR CLEANING AND INSPECTION OF CONCRETE FLOOR ADJACENT TO WALL.
2. CONTRACTOR WILL PLUG OR OTHERWISE SEAL ALL OPENINGS, CRACKS, OR HOLES FOUND IN FLOOR OR WALL USING ITEMS 582.05 OR 582.06 AS SHOWN OR A.O.B.E.
3. THE CONTRACTOR WILL THEN REINSTALL THE GRAVEL BERM USING ITEM 620.04 AND 203.03. SEE NOTE 6
4. THE CONTRACTOR MAY CHOOSE TO USE A TEMPORARY PIPE UNDER ITEM 552.0601 INSTEAD OF SAND BAGS. THE MINIMUM PIPE SIZE OPENING WILL BE 3 SQUARE FEET OR EQUIVALENT.
5. COMPACTION REQUIREMENTS FOR ITEM 203.03 PLACED BEHIND THE UNDERMINED WALL WILL BE WAIVED DUE TO INSTABILITY OF THE COLLAPSED BY-PASS CHANNEL, WHICH LIMITS ACCESS AND MOBILITY REQUIRED FOR COMPACTION AND CONSTRUCTION EQUIPMENT.
6. CONTRACTOR WILL REMOVE EXISTING GRAVEL BERM FROM CONCRETE FLOOR BETWEEN STA. C 3+40 RT. TO STA. C 3+80, LT. UNDER ITEM 203.02, STORE ON SITE AND REPLACE AS SHOWN ON DWG. NO-2 UNDER ITEM 203.03.

NOTE:
VERTICAL CONTROL IS BASED ON THE 1929 MEAN SEA LEVEL DATUM UTILIZING U.S. COAST AND GEODETIC SURVEY BENCH MARKS. BARGE CANAL DATUM +1.17' HIGHER.

AS-BUILT REVISIONS

SIGNATURE _____ DATE _____

MISCELLANEOUS DETAILS

STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION

DRAWING No.	SCALE	DATE	REGION
NO-1	AS SHOWN	9/87	REGION 1

IN CHARGE OF [illegible] DESIGNED BY [illegible] CHECKED BY [illegible] ESTIMATED BY [illegible] CHECKED BY [illegible] DRAFTED BY [illegible] CHECKED BY [illegible] DATE [illegible]

00296
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